APPENDIX

Meetings

Summits

NIA Compliance

FHWA: Off-Model Air Quality Analysis – A Compendium of Practice – August 1999

Turbo Architecture Output

Triad Region Sausage Diagram

Triad Turbo Architecture Interconnect Diagram

Triad Turbo Architecture Flow Diagram

Triad Inventory to Market Package Comparison

Triad Market Packages Report

Triad Relevant Standards Activities

Triad Stakeholders Report

Triad Regional Architecture (Sample)

- Complete architecture is 330 pages long and included in a separate appendix.

ITS Strategic Deployment

Triad Region
Consensus Building Meeting
July 7, 1999, 10:30 AM
MEETING SUMMARY

Attending:

Name	Agency	Phone	Fax	Email
Roberto Canales	NCDOT – Const. & Maint.	919-715-5662	919-715-2656	rcanales@dot.state.nc.us
John Davenport	NCDOT – Division Nine	336-761-2257	919-715-2656	jdavenport@dot.state.nc.us
Jerry Dudeck	NCDOT	919-733-4705	919-733-2417	jdudeck@dot.state.nc.us
Patty Eason	NCDOT – Division Seven	336-334-3192	336-334-3637	peason@dot.state.nc.us
Greg Fuller	NCDOT	919-733-8021	919-715-0955	gfuller@dot.state.nc.us
Terry Hopkins	NCDOT – Cong. Mgmt.	919-250-4151	919-250-4195	thopkins@dot.state.nc.us
Pat Ivey	NCDOT – Division Seven	336-334-3637	336-334-3637	pivey@dot.state.nc.us
Ann Lorscheider	NCDOT – Cong. Mgmt.	919-250-4151	919-250-4195	alorscheider@dot.state.nc.us
JoAnn Oerter	NCDOT	919-250-4195	919-250-4195	joerter@dot.state.nc.us
Tom Parker	NCDOT – TMS	919-733-1506	919-715-0955	tparker@dot.state.nc.us
Troy Peoples	NCDOT – Traffic	919-733-5465	919-733-2210	tpeoples@dot.state.nc.us
Carl Pickney	NCDOT	919-508-1809	919-508-1955	cpickney@dot.state.nc.us
Douglas Waters	NCDOT – Division Nine	336-761-2200	336-761-2347	dwaters@dot.state.nc.us
Richard Atkins	Greensboro DOT	336-373-2437	336-412-6171	richard.atkins@ci.greensboro.nc.us
Terry Bellamy	Greensboro DOT	336-373-2903	336-412-6187	terry.bellamy@ci.greensboro.nc.us
Adam Fisher	Greensboro DOT	336-373-2861	336-412-6171	adam.fisher@ci.greensboro.nc.us
Elizabeth James	Greensboro DOT	336-373-2820	336-373-2809	libby.james@ci.greensboro.nc.us
Carrie Reeves	Greensboro DOT	336-373-2810	336-412-6171	carrie.reeves@ci.greensboro.nc.us
Jim Westmoreland	Greensboro DOT	336-373-2332	336-412-6171	jim.westmoreland@ci.greensboro.nc.us
Brent McKinney	Winston-Salem DOT	336-727-2707	336-748-3370	brentm@ci.winston-salem.nc.us
Greg Turner	Winston-Salem DOT	336-727-2648	336-748-3370	gregt@ci.winston-salem.nc.us
Suzanne Tellechea	Winston-Salem DOT	336-727-2707	336-748-3370	
Phil Conrad	City of Burlington	336-513-5418	336-513-5410	pconrad@ci.burlington.nc.us
Jim Lauritsen	City of Burlington	336-222-5050	336-222-5018	jlauritsen@ci.burlington.nc.us
Andy Grzymski	City of High Point	336-883-3233	336-883-8568	andrew.grymski@ci.high-point.nc.us
Sreekanth Nandagiri	City of High Point	336-883-3231	336-883-8568	sunny.nandagiri@ci.high-point.nc.us
Brad Hibbs	FHWA	919-856-4354	919-856-4353	bhibbs@fhwa.dot.state.nc.us
Max Tate	FHWA	919-856-4354	919-856-4353	jmtate@fhwa.dot.state.nc.us
Debbie Collins	NCSU/ITRE	704-639-7653	704-639-7569	dcollins@interpath.com
Fred Burchett	Kimley-Horn & Associates	919-677-2085	919-677-2050	fburchett@kimley-horn.com
Mark Dunzo	Kimley-Horn & Associates	919-677-2075	919-677-2050	mdunzo@kimley-horn.com
Kenn Fink	Kimley-Horn & Associates	919-677-2237	919-677-2050	kfink@kimley-horn.com

Distribution:

Name	Agency	Phone	Fax	Email
Janet D'Ignazio	NCDOT	919-733-2520		jdignazio@dot.state.nc.us
Blake Norwood	NCDOT	919-733-4705		norwood@swp.dot.state.nc.us
John Watkins	NCDOT	336-334-3192		jwatkins@dot.state.nc.us

Triad Region
Consensus Building Meeting
July 7, 1999, 10:30 AM
MEETING SUMMARY

Arthur Barnes	Winston-Salem Public Trans	336-727-8131	
Gregory Errett	Winston Salem MPO	336-727-2707	
Kenneth King	Greensboro DOT	336-373-2332	
Phil Wylie	City of High Point	336-883-3225	
Gordon Ziegler	DMV	919-733-2426	Gzeigler@mail.dot.state.nc.us

The ITS Strategic Deployment Plan consensus building meeting for the Triad Region was commenced at approximately 10:30 AM at the Justice-Drug Center in Greensboro, North Carolina. Following is a summary of the proceedings of this meeting.

Richard Atkins welcomed the participants and gave a brief statement on the importance of ITS.

Roberto Canales, Fred Burchett, Ann Lorscheider, Mark Dunzo, and Kenn Fink gave a fifteen-minute presentation covering the following topics:

Discussion of purpose and use of plan once completed
Introduction of strategic plan deployment process and meeting purpose
Review of ITS strategic planning in the region to date
Brief review ITS National Architecture
Brief review of ITS
Description of Strategic Plan development and deployment process
Proposed deployment plan schedule

Following the presentation, a package was handed out to participants which included reproductions of the slides used in the presentation, a list of potential transportation stakeholders compiled from databases created during other public input activities, a paper written by Dr. Christina Johnson and Shelley Rowe of the FHWA discussing ITS titled "Intelligent Transportation Systems: The Role of Architecture, " and a brochure distributed by the United States Department of Transportation entitled "Intelligent Transportation Systems – The Future of Transportation Starts Here".

At this point, Fred Burchett repeated to the participants that the main purpose of the consensus building meeting was to help identify transportation stakeholders and ITS champions in the region, and to gather input from the attendees on the proposed process, and to solicit recommendations for making the process more effective.

Fred Burchett then began a directed discussion of specific issues, some of which were contained in the meeting invitation sent to participants prior to the meeting. The issues discussed were:

- Perception of ITS in the Region

- Comments on proposed process
- Identification of stakeholders

Below is a summary of the key points raised during this discussion

- Perception of ITS
  - ITS is Constrained by the TIP
  - Fragmented – lack of resources and control
  - Typically viewed as "icing" on another project
  - Viewed as part of another project, not an essential element
  - Lacks definition
  - Need understanding of benefits to rural areas

- Comments on proposed process
  - Summit may not be as important to Triad Region.
    - Rail Summit produced good input but not yet clear of output.
    - ITS already well underway in Triad Region.
  - Give consideration to providing some up front guidance to the plan.
  - Develop a framework for the plan early in the process.
  - Work through the TACs, and Regional Authority
  - Get support of Board Members, two have a track record of support for ITS projects.
  - Hold a meeting to provide framework for Summit, include at the meeting TCC chairs, divisions, and chambers. Try to keep the number involved at the meeting to around nine or ten.
  - Joint TCC meeting can be replaced with meeting described above.
  - Evaluate need to include some surrounding areas into the Triad Region.

- Potential Stakeholders
  - Auto Industry
  - Tax Payers
  - Board Members
  - Transit
  - Fire/Police/Emergency Services

Following, Fred Burchett indicated that he would be contacting the individuals to set up the meeting to develop the framework for the plan. The meeting was later scheduled for August 9th, at 10:00 AM in the Greesnboro Traffic Management Center. The following individuals were contacted to participate in the meeting: Richard Atkins, Brent McKinney, Phil Wylie, Bob Harkrader, John Watkins, and Doug Waters.

Triad Region
Consensus Building Meeting
July 7, 1999, 10:30 AM
MEETING SUMMARY

Mr. Burchett asked the participants to review the stakeholder lists distributed to them and identify key people (or add key people if not on the list) that should be included in the process. Please return your input to this list to Fred Burchett prior to the August 9th meeting. At this point Fred Burchett thanked the participants for coming and adjourned the meeting at approximately 12:30 AM.

ACTION ITEM(S):

- Provide Stakeholder Names to Fred Burchett no later than 8/8/99.

ITS Strategic Deployment

Triad Region
Planning Meeting
August 9, 1999, 10:00 AM
MEETING SUMMARY

Attending:

Name	Agency	Phone	Fax	Email
Bob Harkrader	City of Burlington	336-222-5113	336-513-5410	bharkrader@ci.burlingtion.nc.us
Nolan Kirkman	City of Burlington	336-513-5420	336-222-5004	nkick@ci.burlington.nc.us
Phil Wylie	City of High Point	336-883-3225	336-883-8568	phil.wylie@ci.high-point.nc.us
Adam Fischer	Greensboro DOT	336-373-2861	336-412-6171	adam.fisher@ci.greensboro.nc.us
Jim Westmoreland	Greensboro DOT	336-373-2332	336-412-6171	jim.westmoreland@ci.greensboro.nc.us
JoAnn Oerter	NCDOT	919-250-4195	919-250-4195	joerter@dot.state.nc.us
J.W. Watkins	NCDOT	336-334-3192	336-334-3807	jwwatkins@mail.dot.state.nc.us
Ann Lorscheider	NCDOT – Cong. Mgmt.	919-250-4151	919-250-4195	alorscheider@dot.state.nc.us
John Davenport	NCDOT – Division Nine	336-761-2257	919-715-2656	jdavenport@dot.state.nc.us
Douglas Waters	NCDOT – Division Nine	336-761-2200	336-761-2347	dwaters@dot.state.nc.us
Patty Eason	NCDOT – Division Seven	336-334-3192	336-334-3637	peason@dot.state.nc.us
Brent McKinney	Winston-Salem DOT	336-727-2707	336-748-3370	brentm@ci.winston-salem.nc.us
Fred Burchett	Kimley-Horn & Associates	919-677-2085	919-677-2050	fburchett@kimley-horn.com
Mark Dunzo	Kimley-Horn & Associates	919-677-2075	919-677-2050	mdunzo@kimley-horn.com
Kenn Fink	Kimley-Horn & Associates	919-677-2237	919-677-2050	kfink@kimley-horn.com

The ITS Strategic Deployment Plan planning meeting for the Triad Region was commenced at approximately 10:00 AM at the Justice-Drug Center in Greensboro, North Carolina. Following is a summary of the proceedings of this meeting.

Fred Burchett began the meeting by asking the participants to introduce themselves, and reviewing the agenda for the meeting. Mr. Burchett stated that the purpose of the meeting was to have a working session to identify potential projects in the Triad Region. Mr. Burchett then asked each agency represented to provide an overview of planned or potential projects in their area.

Planned or Potential Projects

Burlington

- Computerized signal system upgrade
- Place cameras at key intersections/interchanges
- Begin to share five cameras with the State
- Develop a web site to show the cameras
- Provide some ITS features at railroad crossing versus grade separating the crossings

Greensboro

- Cable TV is expanding services throughout county and City is investigating opportunities with them to supply CCTV

- Signal system upgrade
  -converting existing twisted pair copper cable to fiber optic cable
- Camera system – KMC dark fiber
- CMS – reverse lanes
- Transit – GPS/AVL
  -multimodal center
- Traveler information system
- Red light enforcement

High Point

- Signal system
- Add additional CCTV units
- VMS for the Furniture Market
- Communication with the Greensboro system so the systems can share information such as CCTV/coordinate on NC68
- Transit
  -expand
  -link to multimodal center
- PART programs
- Furniture market transportation system
  -park and ride
- Red light enforcement

Winston Salem

- Public transportation
- Software for paratransit
  - 54 vehicles now AVL equipped
- Provide Traveler information (automated) to provide "One stop shopping"
- Sharing information with others in the Region
- CCTV camera
- Reversible lanes where applicable

Division 7

- Four (4) cameras on I-40 in "The Valley"

Division 9

- Project on 52
  - -lane control
  - -ramp closure
- Kernersville signal system
  - -reverse lanes
- Transit Services
- Traveler Information System
- Investigate ramp metering

Statewide

- Provide traveler information on web site – (ncsmartlink.org)
- Lane closure reporting system

Mr. Burchett than began a roundtable discussion of the Regional needs for the Triad

Triad Needs

- Traffic signal coordination in Kernersville
- Railroad crossings
- Traveler information system
- Integration of systems
- User survey should be performed to determine how people want to receive traffic and transit information
- Maintenance and Operations – Funding and organization
- Wendover/Battle Ground Urban Arterial ITS solutions
- Accidents/Incidents

Specific Projects

- Statewide Freeway Management System
- Traveler Information System
  - -Use existing information compiled at a regional center

Mr. Burchett then asked the participants to list the top three projects to be evaluated for their specific areas and email those projects to him by 8/13/99. The group agreed to reconvene on September 7 at 10:00. Mr. Burchett adjourned the meeting at approximately 12:30 PM.

Triad Region
Planning Meeting
August 9, 1999, 10:00 AM
MEETING SUMMARY

ACTION ITEM(S):

- Those who have not provided top three projects please email them to Fred Burchett at fburchett@kimley-horn.com or fax them to (919) 677-2050 by 9/1/99.

ITS Strategic Deployment

Triad Region Summit
October 12, 1999, 8:00 AM
MEETING SUMMARY

Attending:

Name	Agency	Phone	Fax
Carol S. Allen	Mayor of Greensboro	336-373-2396	336-373-2117
Richard Atkins	Greensboro DOT	336-373-2437	336-412-6171
Kirk Baker	Kernersville		
Kelly Becker	NCDOT – Traffic Engineering	919-715-0952	
Lee Bostic	High Point Police		
Joanne W. Bowie	29th District Representative	336-733-5877	
Anna Brigman	NCDOT – Statewide Planning	919-733-4705	919-733-2417
Larry Brown	Mayor of Kernersville	336-996-5949	
Fred Burchett	Kimley-Horn & Associates	919-677-2085	919-677-2050
Sandy Carmany	Greensboro City Council	336-373-2396	336-373-2138
Jonathan Cleghon	Kimley-Horn & Associates	919-677-2185	919-677-2050
Alena Cook	NCDOT – Statewide Planning	919-733-4705	919-733-2417
Bill Cresenzo	Triad Business News	336-854-3001	336-854-3013
Marie A. Culbreth	City of Thomasville	336-475-7126	336-475-3202
Arlie F. Culp	30th District Representative	336-824-2218	
Jeff Dale	NCDOT – Freeway Mng.	919-250-4151	919-250-4159
John Davenport	NCDOT – Division 9	336-761-2257	336-761-2347
Linda Davis	Winston-Salem Police Chief	336-773-7701	336-773-7996
Matthew Dolge	Northwest Piedmont COG		
Mark Dunzo	Kimley-Horn & Associates	919-677-2075	919-677-2050
Gregory L. Errett	City of Winston-Salem DOT	336-727-2707	336-727-2361
James M. Faircloth	Village of Clemmons	336-766-0021	336-766-6600
Kenn Fink	Kimley-Horn & Associates	919-677-2237	919-677-2050
Adam Fischer	Greensboro DOT	336-373-2332	336-412-6171
Bryan Fulbright	City of Thomasville	336-475-7126	336-475-3202
Greg Fuller	NCDOT		
Linda Garrou	20th District Representative	336-922-6142	
Spencer Glen	WSF City Schools		
Charlie L. Hamilton	Kernersville – Director of PW		
Bob Harkrader	City of Burlington – Planning	336-222-5110	336-222-5019
Liz Harris	Winston-Salem Chamber T-C		
Stephanie Harris	Kimley-Horn & Associates	919-677-2187	919-677-2050
Linda Hollis	High Point Chamber of Comm.		
Terry Hopkins	NCDOT – Traffic Congestion	919-250-4151	919-250-4159
S. P. (Pat) Ivey	NCDOT – Division of Highways		
Herb Jackson	Guilford Co. Sheriffs Dept.		
Ted Johnson	Airport Authority	336-665-5600	336-665-1425
H. R. Jones	City of Burlington Police	336-229-3540	336-229-3146
Steve Kennedy	City of Greensboro	336-373-2329	336-373-2338

Triad Region Summit
October 12, 1999, 8:00 AM
MEETING SUMMARY

Ken King	Greensboro DOT	336-373-2880	336-412-6171
Nolan Kirkman	City of Burlington		
Margaret Kluttz	Board of Transportation	704-630-0346	
Ann Lorscheider	NCDOT – Congestion Mgmt.	919-250-4151	919-250-4195
Walter Marshall	Forsyth Co. Board of Comm.	336-748-3231	336-727-8446
D. Brent McKinney	City of Winston-Salem DOT	336-727-2707	336-727-2361
Tyler Meyer	Greensboro DOT	336-373-6338	336-412-6171
David Morris	Winston-Salem TA		
Robert Murrau	Fox 8 – WGHP TV		
Sreekanth Nandagiri	City of High Point	336-883-3231	336-883-8568
Patti Newsome	NCDOT Division 9	336-761-2257	336-761-2347
Steve Newsome	Winston-Salem Police	336-773-7701	336-773-7996
JoAnn Oerter	NCDOT	919-250-4195	919-250-4195
Tom Parker	NCDOT		
Carrie Reeves	Greensboro DOT	336-373-2332	336-412-6171
Scott W. Rhine	NCDOT	919-733-4713	919-733-1391
Dalton Ruffin	NCDOT	336-722-2336	
Len Sanderson	NCDOT		
Doris Schultz	Winston-Salem TA		
Andy Scott	City of Greensboro	336-373-2349	336-412-6315
Mike Simpson	City of Greensboro	336-545-5955	
Steve Smotherman	High Point Economic Dev.	336-883-3305	336-883-3052
Rebecca Smothers	Mayor of High Point	336-883-3289	
David W. Spainhour	NCDOT Division 9	336-631-1340	336-761-2347
Bob Stebbins	Mayor of Lewisville	336-945-5558	336-945-5531
Suzanne Tellechea	Winston-Salem TA		
James Upchurch	NCDOT – Statewide Planning		
Angela Watson	Hi Tran	336-889-7433	
Jim Westmoreland	Greensboro DOT	336-373-2863	336-412-6171
Philip L. Wylie	City of High Point	336-883-3225	336-883-8568

The ITS Strategic Deployment Plan - Triad Regional Summit commenced at approximately 8:00 AM at the Holiday Inn Four Seasons in Greensboro, North Carolina. Following is a summary of the proceedings of this meeting.

8:00-9:00 AM Guests were registered and given the opportunity to explore demonstrations that were given on ITS technology. Included was a demonstration of web pages showing real-time traffic information and a video demonstrating ITS applications. During this time breakfast was also served.

Triad Region Summit
October 12, 1999, 8:00 AM
MEETING SUMMARY

9:00-9:15 Mr. Len Sanderson, the State Highway Administrator, welcomed guests and presented an overview of ITS and the days events.

9:15-10:00 Fred Burchett, Mark Dunzo and Kenn Fink presented an overview of ITS that included specific technologies as well as their benefits.

10:00-10:30 Ms. Margaret Kluttz, a member of the North Carolina Board of Transportation, and Mr. John Davenport, the NCDOT Division 9 Traffic Engineer, presented an overview of ITS in Winston-Salem.

10:45-11:45 Break-out sessions were conducted with four groups, each one focusing on a specific topic. Groups were asked to answer/discuss a series of questions on the topics of Traffic/Incident Management (2 groups), ITS for Transit, and Traveler Information Systems. Findings from the break-out groups are shown below.

BREAK-OUT GROUP FINDINGS

TRAFFIC MANAGEMENT

The Perfect Roadway Would Have...

- No other cars
- Other modes of transportation
- Less congestion
- Tree lines streets (esthetically pleasing)
- No left turns
- Clean roadway
- No billboards or sign overload
- Bicycle trails
- No construction drums
- A good bus system
- Limited access/control
- Telecommuters
- Staggered work times
- Coordinated signal systems
- No traffic signals
- One-way streets
- Merging rather than signals (roundabouts)
- More bypasses
- Accident investigation sites (a blind to eliminate rubber-necking)

- Sidewalks
- Bike lanes separated from the road
- Toll lanes
- Bus/HOV lanes

As a motorist, what are the biggest frustrations?

- Road rage
- Lack of courtesy
- Drivers who speed to head of merge – that cause back-up
- Not knowing information about incidents until you get to the site
- Construction needs to be controlled
- Weaving in short distance at high speed
- Speeders
- Driving too slow in the fast lane
- Signals that turn red when there is no side traffic
- Non-synchronized traffic signals
- Trucks (tractor trailers) – designate specific lanes for them
- Unexpected delays
- Signal stops and delays
- Lack of information on current conditions
- Lack of continuity on corridors
- Incidents/construction violate expectations

What information can be shared between agencies and users?

- Lack of information
- Get information from customer

How can communication be enhanced?

- Increase web sites
- Public television
- News media/radio
- Grocery stores
- Get what customer wants on the distribution of information

How can technology enable that?
- More signs
- AM radio
- Education on alternatives

How can communication enable that?
- Make sure communication is real-time

Other alternatives and problems
- Change zoning
- Priority should be given to community not distributors
- We build to promote Single Occupancy Vehicle (SOV) use; need to educate on transit
- Urban sprawl
- Lifestyles
- No alternatives
- No densely located neighborhoods

Communication/Technology
- Promote mass transit
- Show benefits of transit vs. SOV
- Define alternatives
- Define solutions
- Change mindset to using technology rather than building roads
- Showcase areas that are using public transportation and how it works
- Show success stories both locally and nationally
- Increase communications
- Work regionally, not divisionally
- We can get persons from one city to another but we can't get them around once they are there

What is the perfect way to get to work?
- Not driving
- Plan before gridlock
- Get information to commuters – real-time video images on television
- Coordination between signal systems – tie into air quality, look at major traffic generators
- Hands free cellular phone for information/safety
- Educate/inform public of ITS

How do we meet driver expectations?

- Better funding for operation and maintenance of existing systems – extends life, optimizes benefits
- Better maintenance and more reliability
- Build better models
- Develop inter-division management teams that plan across state/county/division lines
- Accelerate projects (concept to construction)
- Maximize "Bang for Your Buck"
- Clearinghouse for traffic information
- Revisit pay rates for City's to Maintain NCDOT equipment (schedule C & D rates)
- Incorporate ITS with network planning

PUBLIC TRANSPORTATION

Triad Issues

- From homes to work
- Frequency
- Centrally based
- Few circular routes
- User friendly – so users will choose transit over personal vehicle
- Cross modes
- Expanding existing infrastructure
- Buses sitting in same traffic
- Signal priority
- High Occupancy Vehicle (HOV)
- Express routes at peak times
- Using existing parking as park-and-ride
- Employer covering costs
- Cost is problem to provider
- More convenient transfer connections
- Easier to serve Central Business District (CBD) vs. County
- Lack of East-North connectors
- Fixed routes bounded by city limits
- Funding sources also constrained by certain boundaries
- Funding is question for PART
- Can't get from city to city – user concern
- Maintaining quality of life for users
- Currently working toward one phone number for information on all transportation

- Person may vary mode choice from day to day

Solutions to Problems

- High-speed rail through the Piedmont
- Inter-city rail and commuter rail
- Strong connections between cities
- Very convenient and frequent inter-city transit system
- Land development doesn't necessarily support CBD typical transit
- Possibly small vehicle for use once user reaches the city (alternative fuel)
- Yellow bikes
- Involve current fixed route system
- Fewer time limits on transit use (more west-east options)
- Alternate fuel for transit vehicles
- Expand current plans on fixed guideway and rail
- Smart Card technology
- One source for traffic information
- Sidewalks at/near bus stops
- Cross-training and educating employees and users

Candidate Technologies

- Automated vehicle location for buses
- Signal priority for transit vehicles
- Vanpool can cross jurisdictional boundaries – requires multiple users at one time with same destination; mainly employee based
- Cater to corporations to increase revenue

TRAVELER INFORMATION SYSTEMS

What transportation information do you currently use?

- Radio
- Television
- Changeable message signs
- Co-workers
- 900MHz radio at work
- AAA
- Newspaper

What transportation information do you wish you had?

- How long will it take me to get home
- What detour routes should I take
- When and where is construction happening
- Special events
- Weather advisory
- Accident clearance times

What do you think the preferred method for providing traveler information should be?

- Radio
- Television
- Internet
- Changeable message sign
- Cellular
- Pager

11:45-12:15 A summary of each of the break-out group's findings was presented to the entire group

12:15-1:15 The Honorable Becky Smothers, Mayor of High Point and PART Chairperson spoke as lunch was being served on "The Role of a Regional Transportation Authority in ITS Deployment".

ACTION ITEM(S):

- Please direct all questions and/or comments to Fred Burchett at fburchett@kimley-horn.com, (919) 677-2085.

National ITS Architecture Compliance

The Statewide ITS Architecture and Strategic ITS Deployment Plan development process are both intended to be planning tools. The Strategic ITS Deployment Plan is a planning document which draws inputs from potential ITS customers throughout the State and Region. These inputs are logged and documented, then ranked to provide a snapshot of the perceived ITS needs for the next 20 years. Based on this documentation, the benefits of each project or improvement can be identified and, in turn, added to regional Transportation Improvement Plans (TIP) and the North Carolina Statewide Transportation Improvement Plan (STIP).

The development of the Statewide ITS Architecture is intended to guide the implementation process by providing a structure around which to design. ITS elements and concepts are generically named to permit a wide variety of design options, changes in technology, or institutional changes that occur over time. The intent is to provide freedom to designers and implementers by providing a stable structure for interconnection while providing flexibility to meet the unique needs of specific users.

The National ITS Architecture is divided into three levels: logical, physical and technical. The logical architecture provides a functional view of a system that assists in organizing complex entities and relationships by identifying system functions and information flows. The logical architecture guides development and deployment through functional requirements that are independent of institutions and technology. The logical architecture does not identify how each ITS function is to be implemented.

The physical architecture is the physical representation of how a system should provide the desired functionality. The physical architecture defines the information and data flows between elements and the communication requirements needed to make the system function. The data flow definitions within the physical architecture require standards to provide functionality between systems, which is the basis of the ITS standards development process.

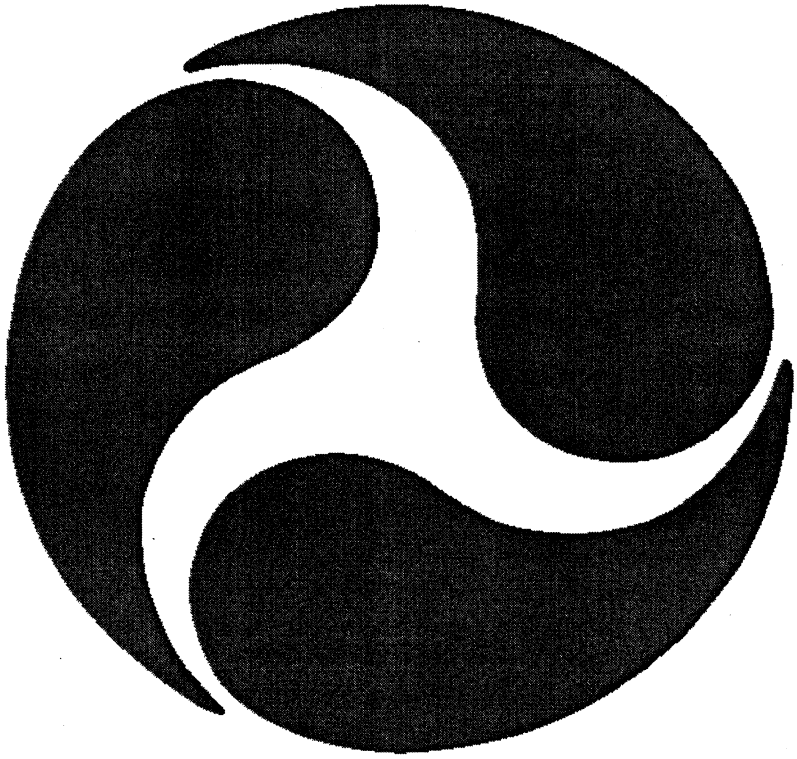
The technical architecture is the formal design and implementation process. The technical architecture defines the implementation of the physical architecture. The technical architecture is the formal design and implementation that defines system hardware and software functionality, their interaction, and the deployment of a system that processes and distributes the gathered data.

The three levels of the National ITS Architecture work together to refine the ITS needs from the planning stage down to a specific hardware deployment. For example, the logical and physical architecture may identify the need for shared traffic information. The physical architecture would define traffic information as traffic data from detectors and video from CCTV cameras.

The purpose of this document is to develop a logical architecture for ITS deployments in the State of North Carolina. The physical architecture is part of this document, but only in describing the interaction between elements, centers, etc. The appendices document the physical architecture through the data flow diagrams and other visual methods.

This document provides the logical and physical architectures as required by FHWA and used in the long-term ITS deployment throughout the state. The details in the development of the technical architecture are left up to each entity and their designers and implementers. The logical and physical architecture layers are a tool that is to be used by the designers and implementers to ensure that data and information is shared between systems. By approaching the ITS Architecture deployment from the logical and physical levels, this document will serve as a roadmap for ITS deployments throughout the State of North Carolina for years to come without locking the State into specific technologies that may change over time.

Off-Model Air Quality Analysis: A Compendium of Practice



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Southern Resource Center
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Introduction

Air Quality analysis methodologies have become more refined over the years to fill the need in the transportation community to satisfy various requirements including Transportation Conformity and Congestion Mitigation and Air Quality Program project justification. Off-Model methods continue to be developed and refined to allow for analysis of innovative, as well as some common, projects to account for reductions in vehicular emissions. The most typical analysis is associated with Vehicle Miles of Travel (VMT) reductions, but reductions in emissions can also occur due to decreases in vehicular delay.

This is an observation in techniques which have been used in the South to provide for the evaluation of possible emission reductions. For the purpose of this compendium, Off-Model methodologies are analyses performed without the specific use of a Travel Demand Model. As previously stated, these analyses can be used for either of two primary purposes. These two purposes are Transportation Conformity Analyses and Congestion Mitigation and Air Quality (CMAQ) Improvement Program project justifications. The later of these two is probably the most crucial given the need for project justification as a funding mechanism; however, with the increasing difficulties in showing an offset of VMT growth in most areas, any reduction will only provide a benefit to the Conformity Process.

This compendium offers a look into several methodologies utilized in Federal Highway Administration's Southern Resource Center geographic area and may be duplicated and disseminated at will. These methodologies are not all encompassing but should offer valuable insight into Off-Model practice. Updates of this compendium will occur and include any needed changes in the reference section.

If you have any questions or comments please address them to:

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Intersection Improvements

1. General Analysis

This analysis incorporates a conservative approach to intersection improvements. It can be used for grade separation and signal timing. The conservative approach is only analyzing Volatile Organic Compound (VOC) reductions; however, NO_x may be analyzed in a similar fashion.

The analysis is as follows:

a) Calculate the existing VOC emissions.
$VOC_B = EF_B * VOL_{APP} * DIST_{APP}$

where,
VOC_B = Emissions before improvement, grams
EF_B = Emission factor (grams per mile) based on assumed speed before improvement
VOL_{APP} = Peak period approach volume
$DIST_{APP}$ = Approach distance in miles

b) Determine the average speed after the improvement.

c) Calculate the VOC emissions after the improvement.
$VOC_A = EF_A * VOL_{APP} * DIST_{APP}$

where,
VOC_A = Emissions after improvement, grams
EF_A = Emission factor (grams per mile) based on average speed after improvement

d) Calculate daily VOC emission reductions.
$VOC_R = (VOC_B - VOC_A)$

where,
VOC_R = VOC emission reductions, grams/day

2. Traffic Signal Computer Upgrade[2]

The analysis of this project was for the upgrade of computer equipment and software, cabinets and controllers, and replacement of the Communications Plant. The justification was based on an increase in the reliability of the traffic control device synchronization in the metropolitan area. This would decrease delays and reduce vehicle idle emissions. The analysis for this project was performed as follows:

a) 3-4 minutes per vehicle per direction on a major arterial with an average vehicle rate of 38,000 vehicles or 2533 hours per day was assumed to be the savings by having the more reliable system. These are the savings for a single computer section.

b) There were 60 computer sections amounting to a savings in idle time of 152,000 hours of vehicle delay per day.

c) Emission rates were established by Hillsborough County using Mobile 5a. The rates were as follows:
CO = 0.32018 kg/vehicle hour
VOC = 0.0227 kg/vehicle hour
NO_x = 0.00988 kg/vehicle hour

d) To be conservative, especially with the negative benefits which would occur for NOx with an increase in speed, emission benefits were assumed to occur only during the AM and PM peak periods (4 hours total).

e) The benefits were then calculated.
CO = (0.32018 kg/vehicle hour)(152,000 veh hrs/day)(4 pk hrs/24 hrs) = 8,111 kg/day (8.922 tons/day)

VOC = (0.0227 kg/vehicle hour)(152,000 veh hrs/day)(4 pk hrs/24 hrs) = 575 kg/day (0.632 tons/day)

NO_x = (0.00988 kg/vehicle hour)(152,000 veh hrs/day)(4 pk hrs/24 hrs) = 250 kg/day (0.275 tons/day)

Note: Delay reductions can be obtained through most intersection analysis software.

High Occupancy Vehicle (HOV) Lanes

1. General Analysis

Similar to the general intersection analysis, the HOV lane analysis is again conservative with only VOC reductions accounted; however, NO_x may be analyzed in a similar fashion. This analysis also assumes that emission reductions are for the HOV lane only.

The analysis is performed as follows:

a) Calculate the existing VOC emissions.
$VOC_B = EF_B * VOL_B * DIST$

where,
VOC_B = Emissions before improvement, grams
EF_B = Emission factor (grams per mile) based on assumed speed before improvement
VOL_B = HOV Volume * Auto Occupancy of HOV / AO of Mixed Flow
DIST = HOV lane distance in miles

b) Determine the average speed after the improvement.

c) Calculate the VOC emissions after the improvement.
$VOC_A = EF_A * VOL_A * DIST$

where,
VOC_A = Emissions after improvement, grams
EF_A = Emission factor (grams per mile) based on average speed after improvement
VOL_A = HOV Volume after improvement

d) Calculate daily VOC emission reductions.
$VOC_R = (VOC_B - VOC_A)$

where,
VOC_R = VOC emission reductions, grams/day

Transit Improvements

1. General Analysis

The key to Transit Improvements is increased ridership. If transit ridership goes up then Vehicle Miles of Travel (VMT) should be reduced proportionately. The approach to this analysis is trend, that is, the analysis should call on previous expansions and their effect on ridership as input into the analysis. Since this increased ridership actually decreases VMT, reductions are found for both VOCs and NQ.

The analysis is as follows:

a) Calculate the daily VMT reduction.
VMT = (Avg. Daily Ridership After - Avg. Daily Ridership Before) / Avg. Auto Occupancy * Avg. Trip Length

b) Calculate the reduction in daily emissions.
$E_D = EF_x * VMT$

where,
E_D = Daily Emissions, grams/day
EF_x = Emission factor for pollutant x, grams/mile
VMT = vehicle mile/day

2. Express Bus Service for Broward County, Florida[3]

The analysis of this project was done to add new Express Bus Service in Broward County Florida. The basis for the project was to provide a needed service to the general public and reduce Vehicle Miles of Travel (VMT). The new transit service will operate during the morning (AM) and afternoon (PM) peaks. The AM peak will consist of three one-way trips from southwest Broward County to Downtown Fort Lauderdale with one return trip. The PM peak will consist of the reversal of the AM peak. Each peak is considered for exactly two hours (6:00AM to 8:00AM and 4:00PM to 6:00PM). The analysis for the project is as follows:

a) The Peak Hour Ridership was determined by running the FSUTMS model (Florida's Travel Demand Model). Both the AM and PM peak ridership were calculated by multiplying the peak hour ridership by 2.0 hours to yield Person Trips.
Peak Hour Ridership (from FSUTMS) = 54 Person Trips
AM Peak = 2.0 Hours * 54 = 108 Person Trips
PM Peak = 2.0 Hours * 54 = 108 Person Trips
Daily Person Trips = 108 + 108 = 216 Person Trips

b) An estimate of auto trips is found by dividing the person trips by the average auto occupancy for Home Based Work (HBW) trips.

216 Person Trips / 1.12 = 193 Auto Trips

c) An estimate of VMT is then calculated by assuming the auto trips would have taken the same trip length as the new service or 31.0 miles.
193 Auto Trips * 31.0 Miles/Trips = 5983 Daily VMT

d) The daily reduction in NO_x and VOC is found from MOBILE 5.0a using Light Duty Gas Vehicle (LDGV) emission rates. The average speed is derived from the average auto travel speed along the proposed transit route, which is 37.9 mph.
NO_x emission reduction = 5983 VMT * 1.63 g/mile * kg / 1000 g = 9.75 kg/day

VOC emission reduction = 5983 VMT * 1.25 g/mile * kg / 1000 g = 7.48 kg/day

e) The increase in VMT due to the express service is then found with the knowledge that there are four trips per peak period, again, with a distance of 31.0 miles.
Daily Transit VMT Increase = 31.0 * 8 trips/day = 248 Daily VMT

f) The daily increase in NO_x and VOC is found from MOBILE 5.0a using Heavy Duty Diesel Vehicles (HDDV) emission rates. The average speed is derived from the average bus speed along the proposed route, which is 28.7 mph.
NO_x emission increase = 248 VMT * 1.8 g/mile * kg/1000g = 0.45. kg/day
VOC emission increase = 248 VMT * 11.68 g/mile * kg/1000g = 2.90 kg/day

g) The net reduction is then found.
NO_x emission reduction = [9.75 - 2.90] kg/day = 6.85 kg/day
VOC emission reduction = [7.48 - 0.45] kg/day = 7.03 kg/day

3. Transit Centers[1]

Transit centers combine frequent bus service with park and ride (P&R) lots. The main benefit of these facilities is to reduce VMT, thus allowing for a reduction in both ozone precursors. The analysis for these facilities/projects is as follows:

a) The first step in the analysis is to estimate the number of autos removed by the new facility.
Autos Removed = Historical P&R Lot Utilization * Parking Spaces in Lot

b) Next, knowing the average peak hour speed and the average driving distance for the area emission reductions can be found. Note: Distance is multiplied by 2 to account for round trip.
Auto Emission Reduction = Autos Removed * (Avg. Driving Distance * 2) *Peak Hour Speed Emission Rate for LDGVs

c) Calculate the emissions from the increase in transit vehicles, utilizing known Avg. Driving Distance and Avg. Peak Hour Speed.
Bus Emission Increase = # of Bus Increase * (Avg. Driving Distance * 2) *Peak Hour Speed Emission Rate for HDDVs

d) The final calculation yields emission reductions in kg/day.
Daily Emission Reductions = (Auto Reductions - Bus Increase) * kg/1000g

4. Park and Ride Lots[1]

The P&R lot analysis is similar to the analysis of the transit center with the exception that increased bus service is not added. The analysis is as follows:

a) The first step in the analysis is to estimate the number of autos removed by the new facility.
Autos Removed = Historical P&R Lot Utilization * Parking Spaces in Lot

b) Next, knowing the average peak hour speed and the average driving distance for the area the total emission reductions can be found in, kg/day.
Auto Emission Reduction = Autos Removed * (Avg. Driving Distance * 2) *Peak Hour Speed Emission Rate for LDGVs * kg/1000g

Note: Distance is multiplied by 2 to account for round trip.

5. Alternative Fuel Buses[14]

Broward County, FL proposed to buy 4 alternative fuel (electric) transit buses to operate as circulators in Downtown Ft. Lauderdale. The purpose of this analysis is to demonstrate that using electric buses instead of the heavy-duty diesel buses will improve air quality.

Assumptions

- Buses will operate weekdays between 7:30 am and 5:30 pm (10 hours)
- 30 minute (0.5 hour) headway between buses per route
- Number of Daily Trips = Operation/Headway = 10 hours/0.5 hours = 20 Trips
- Average bus running speed is 14.4 mph
- Electric buses were assumed to produce zero emissions
- MOBILE model was used to obtain HDDV emission rates
- Round Trip distance is approximately 4.8 miles.

Analysis

a) Estimate emissions due to operating 4 diesel buses.

Emissions = Number of Buses * Round Trip Length * Number of Daily Trips * Emission Factor

VOCs = 4 buses * 4.8 round trip miles * 20 trips/day * 0.0030 kg/mile = 1.15 kg/day
CO = 4 buses * 4.8 round trip miles * 20 trips/day * 0.0163 kg/mile = 6.26 kg/day
NOx = 4 buses * 4.8 round trip miles * 20 trips/day * 0.0149 kg/mile = 5.72 kg/day

b) The above values reflect the emissions that would be reduced by replacement of the diesel buses with alternatively fueled buses thus showing an improvement in air quality.

6. Tampa Historic Electric Streetcar[15]

The proposed historic street car, when completed, provides intermodel connections for persons who arrive at the Convention Center or one of the hotels from Tampa International Airport and who have taken a taxi to downtown. To calculate emission benefits the following methodology was used.

a) Ridership projections were obtained from annual attendance figures estimated by the City of Tampa, Ybor City, the Port Authority, the Tampa Bay Lightning, the Florida Aquarium, and the Tampa Convention Center. Ridership figures were also based on the Memphis, TN streetcar project. The Memphis project is given reference since the attractions along the system are more relative to that of the Tampa/Ybor area. Based on the Memphis project a conservative 5% ridership at each of these venues was used for calculations. To estimate the miles saved an assumption was made that half of the estimated 5% ridership would ride the streetcar the 4.5 mile round trip between Ybor City and the Garrison Seaport District and the other half would ride shorter 2 mile trips.

	Yearly Projected Attendance	5% Ridership Assumption
Arena (Tampa Bay Lightning)	800,000	40,000
Aquarium	1,000,000	50,000
Crosstown-Ybor	1,320,000	66,000
Cruise Ships	300,000	15,000
Hogan Burke Theater	1,000,000	50,000
Hotels-Convention Center		
Convention Center	112,000	5,600
Special Events	305,000	15,250
Hyatt Regency	201,000	10,050
Local Events		
Guavaween	75,000	3,750
St. Patricks/Jose Riley	4,000	200
Gasparilla	100,000	5,000
Special Weekend	75,000	3,750
Total		264,600

b) Calculate VMT reductions.
132,300 passengers travel 2.0 miles round trip = 264,600
132,300 passengers travel 4.5 miles round trip = 595,350

Total = 859,950 miles/year = 2356 miles/day

c) Calculate emission reductions achieved from the program.

Emission Reductions = VMT * Emission Factor

VOCs = 0.0014 kg/mile * 2356 mile/day = 3.3 kg/day
CO = 0.0114 kg/mile * 2356 mile/day = 27 kg/day
NOx = 0.002 kg/mile * 2356 mile/day = 5 kg/day

7. Bus Bays on Oakland Park Boulevard[16]

Broward County proposed to build 5 transit bus-bays along Oakland Park Boulevard between Andrews Avenue and Inverrary Boulevard. Currently there are three transit routes that provide service and make frequent stops along that segment of Oakland Park Blvd. The purpose of this analysis is to demonstrate that building bus bays will improve air quality by estimating the reduction in time loss due to buses stopping to load and unload passengers. The concept is based on the reductive effects of local transit buses on the traffic carrying capacity of an arterial street. The concept in Chapter 12 of the 1994 Highway Capacity Manual (HCM) was used to estimate that reduction. For comparison purposes, traffic carrying capacity of Oakland Park Blvd. was evaluated under two conditions: one with bus bays and the other without.

In the first case, (with bus bays), buses stop in a lane that is not used by moving traffic (curb parking lane), thereby reducing the impeding effects to other traffic. The time loss to other vehicles due to bus stopping at a bus bay is estimated at 4 seconds per bus which counts for bus acceleration and deceleration time in the traffic stream.

In the second case, buses stop in the normal traffic lane impeding traffic flow and causing queuing of vehicles behind the stopped bus. The time loss in this case includes the dwell time to load and unload passengers and time loss for stopping and starting. The time loss for the lane in which the bus operates can be estimated using equation 12-3 of the HCM.

TL = (g/c)*N*(D+L) where,

TL = time loss, in seconds per hour
g/c = intersection green time/cycle time ratio
N = number of buses that stop per hour
D = average dwell time, in seconds
L = additional time loss due to stopping, starting and queuing in seconds (6 to 8 seconds on average).

The analysis covers the impact of constructing five bus bays and to simplify the calculations, the reduction was estimated for one bus bay and then multiplied by five.

Assumptions

- Three bus routes operate along the subject segment of roadway
- 30 minute headway per route
- Number of buses (3*60/30) = 6 buses per hour
- Buses operate 16 hours/day average weekday
- The average speed along Oakland Park Blvd is 24.5 mph

Calculation of Loss Time with Bus Bays

The time loss is due to buses maneuvering in and out of bus bays.

Timeloss/hour = 4 seconds/bus * 6 buses/hour = 24 sec/hr

Where,

Time lost due to bus decel and accel out of bus bay, TL = 4
Number of buses per hour, N = 6
Average g/c = 0.4
Capacity of through lane = 1800 pcphpg (passenger cars per hour per green)
Capacity of one lane per hour at 0.4 g/c ratio = 1,800 * 0.4 = 720 pcphpg
Total green time available to through lanes is 0.4 * 3,600 sec/hour = 1,440 sec/hour

The percent loss in lane capacity may be expressed as:

(24 sec/hr / 1,440 sec/hour) * 100 = 1.7%

This results in a capacity loss in the right lane of 720 pcph * 0.017 = 12 pcph

Calculation of Loss Time without Bus Bays

The average dwell time using results from a field survey is 18 seconds per stop.

with,
g/c = 0.4
N = 6 buses/hr
D = 19 sec/bu
L = 6 sec/bus
TL = 0.4*6*(18+6) = 58 sec/hour

The percent loss in lane capacity is; (58/1,440)*100 = 4.03%

This results in a capacity loss in the right lane of 720 pcph * 0.0403 = 29 pcph

Emission Reduction Estimate

Net Capacity gain due to building Bus Bays = 29 - 12 = 17 pcph

The distance of the highway impacted by each bus bay is 500 feet

Net VMT gained by installing Bus Bays = (500 ft/ 5280 ft/mile) * (17 pcph * 16 hours/day)
= 26 mile/day

The average travel speed is 24.5 mph

VOCs = 26 mile/day * 2.31 g/mile * kg/1000g * 5 locations = 0.30 kg/day
CO = 26 mile/day * 20.31 g/mile * kg/1000g * 5 locations = 2.64 kg/day
NOx = 26 mile/day * 2.48 g/mile * kg/1000g * 5 locations = 0.32 kg/day

Vanpool Programs

1. General Analysis

Vanpools achieve emission benefits by reducing vehicle trips. Average commute distance is doubled to simulate a round trip. Average ridership should be based on historical vanpool size data obtained from the Metropolitan Planning Organization (MPO). The analysis is performed as follows:

a) Calculate vehicles removed by the vanpool.
VMT removed = Historical Vanpool Size / Avg. Vehicle Occupancy

b) Calculate the Daily Emission Reduction achieved by the reduced VMT, kg/day.
ER = VMT removed * Avg. Commute Length * 2 * Peak Hour Speed Emission Rate (LDGV) for Pollutant * kg/1000g

2. Dade County, Florida Vanpool Program[4]

The Dade County Vanpool Program provided 30 vans to qualified participants. Air quality benefits are achieved through the reduction in VMT associated with the reduction of individual commuters. The increase in vehicles due to the vans provides a somewhat negative offset of these benefits. The analysis consists of five steps.

1) Estimate the number of autos removed from the roadway by the vanpool program.
2) Calculate the Daily VMT eliminated.
3) Calculate the emission reductions due to the decrease in VMT.
4) Calculate the addition emissions generated by the new service.
5) Derive the Net Benefits from the Program.

The following provides an example.

a) Reduction in Automobile use is calculated by knowing the amount of seating and the average area auto occupancy. The total seating provided by the vanpool is 345 seats, divided into vans with capacities of 15 and 8 passengers. The average auto occupancy of Dade County is 1.22 persons per automobile. The calculation is as follows:
Autos Eliminated = Vanpool Seats / Auto Occupancy = 345 Seats / 1.22 Persons / Auto = 283 Autos

b) VMT reduction is calculated through the knowledge of average round trip commuter distance for Dade County.
VMT Reduction = Autos Eliminated * Average Commute Distance = 283 Autos * 21.8 Miles / Auto
= 6169 Miles

c) Emission Reductions are found by using the appropriate emission rate for LDGVs.
The Average operating speed for Dade County is 27 mph.
Emission Reduction = Emission Rate * VMT * kg/1000g
Emission Reduction = 81.49 kg/day CO; = 10.49 kg/day VOC; = 10.12 kg/day NO_x

d) Emission increases, due to the implementation of the new vehicles, are calculated knowing the emission rate for Light Duty Gas Trucks (LDGTs) and the VMT for the fleet. The VMT is derived from the fleet size and the average Dade commute distance, previously noted, or 654 VMT.
Emission Reduction = Emission Rate * VMT * kg/1000g
Emission Reduction = 10.63 kg/day CO; = 1.33 kg/day VOC; = 1.22 kg/day NO_x

e) The Net Air Quality difference is thus a product of the Reductions calculated in step c) subtracted by the Increases in emissions calculated in step d).
CO = 70.86 kg/day
VOC = 9.16 kg/day
NO_x = 8.90 kg/day

Other Off-Model Methodologies

1. Incident Management[1]

The main goal of an Incident Management Program is to reduce congestion by removing vehicles which are debilitated, injured or just broke. Nonrecurring Congestion is the effect these vehicles have on the main line flow. Excess freeway emission are caused by this type of congestion. This analysis provides the basis for calculation of reduction of VOCs due to these programs; however, NO_x can be analyzed in a similar fashion.

a) Determine Regional Freeway VOC Emissions, E_B.

b) Determine Freeway Emissions due to Nonrecurring Congestion, E_C.
$E_C = E_B * 0.049$

Note: 4.9 Percent of Freeway Emissions are Caused by Nonrecurring Congestion.[5]

c) Next the Daily VOC reductions, E_D, are calculated. These assume, since freeway emissions are directly related to VMT, that the VMT in the program area is used to calculate emission reductions.
$E_D = L * VOL_i * E_C / VOL_T * EFF$

where,
L = Length of Freeway
VOL_i = Volume of Freeway i
VOL_T = Regional Freeway VMT
EFF = Project Effectiveness, 50% for Incident Detection and Response,
25% for Motorist Assistance, and 15% for Surveillance.

2. Pedestrian / Bikeway - General[1]

The main goal of bicycle and pedestrian facilities is to provide other transportation options for a community. The air quality benefits, as with most projects, come with a reduction in VMT. The general calculation for these projects is shown below.

a) First, calculate the Daily VMT reduction.
VMT Reduction = PD * Area * L * BMS

where,
PD = Population density of location, persons/mile^2
Area = Project length * 1 mile radius, mile^2
L = Round trip length, one-half of the project length times 2 daily trips, miles
BMS = Bike mode share, %

b) Last, calculate the Daily Emission reductions for a pollutant.
$E_D = EF_x$ * VMT Reduction

where,
E_D = Daily Emissions, grams/day
EF_x = Emission factor for pollutant x, grams/mile
VMT = vehicle mile/day

3. Bikeways - General

Little data is available on the utilization of bikeways; however, if such data is available it can prove invaluable in providing mode shift data to predict VMT reduction. The following is an analysis which shows how to calculate emission reductions if a history of mode shift percentage is known.

a) First Calculate daily VMT reduction provided by mode shift in the corridor.
VMT Reduction = AADT in the corridor * PMS

where,
PMS = historical percentage of mode shift for area

b) Last, calculate the Daily Emission reductions for a pollutant.
$E_D = EF_x$ * VMT Reduction

where,
E_D = Daily Emissions, grams/day
EF_x = Emission factor for pollutant x, grams/mile
VMT = vehicle mile/day

4. Sidewalks Near Schools in Farragut, Tennessee[6]

This project connected and extended previously constructed sidewalks along the parental responsibility zone of the Farragut schools. This analysis assumes a minimum usage increase of 10%, with a VMT reduction of 2 miles on arterials and 5 miles on local roads. There are 5,602 students in Farragut schools. It should be noted that students walking remove 4 vehicle trips. The analysis is as follows:

a) Since VMT is reduced on both arterials and local roads, there are two VMT reduction calculations.
Students with Travel Mode Change = 5602 *.10 = 560
VMT Reduction (Arterials) = 560 Persons * 2 Miles / Person = 1120
VMT Reduction (Local) = 560 Persons * 5 Miles / Person = 2800

b) Knowing the Average Speed for the given roadway classification emission factors are generated for both VOC and NO_x by roadway classification.
VOC Reduction = (1120 VMT * .00194 kg/mile) + (2800 VMT * .00227 kg/mile) = 8.6 kg/day

NO_x Reduction = (1120 VMT * .0022 kg/mile) + (2800 VMT * .0019 kg/mile) = 7.8 kg/day

5. I/M Compliance Changes, Texas[1]

Procedures leading to a higher compliance rate for a I/M program benefit air quality by detecting then repairing faulty emission control systems. The Texas Air Control Board was asked to supply projected compliance rates for changes to our current I/M system. Current compliance rates for each county are available from TACB. Emission benefits are calculated with the following equations:

a) The first step is to calculate the emission rates before and after a change in compliance rates, g/day.
Improved Emissions = Projected I/M compliance * AADT * 24hr Avg. Speed Emissions
Previous Emissions = Current I/M compliance * AADT * 24hr Avg. Speed Emissions

b) The final step is to calculate the Daily Emission benefit due to the increased compliance rate, kg/day.
Daily Reductions = (Improved Emissions - Previous Emissions) * kg/1000g

6. Travel Demand Management (TDM), Public Education Campaign, Pinellas County, Florida[7]

The purpose of this project was to provide intermodal transportation information via several programs within a public education campaign to promote a shift from the use of single occupant vehicles (SOV) to alternatives such as bicycle, public transportation, and ridesharing. By educating the public to these transportation options and their cost effectiveness, a substantial number of vehicles could be eliminated from the roadway, thus reducing VMT.

a) The first step in the analysis is to combine the knowledge of Work Trips for the area with the Trip Rate. Pinellas County has an estimated employment of 377,312. Knowing the Home Based Work Trip Rate is 1.8, provided by the FSUTMS model, Daily work trips can be calculated.

Daily Work Trips = Total Employment * Trip Rate = 377,312 * 1.8 = 679,162 Trips

b) The 1991 Tampa Bay Regional Survey conducted by Florida Department of Transportation provided Trip Length Distribution information. This survey showed the Mean Trip Length was 26.6 minutes, reflecting travel time and terminal times. Using an average area speed of 19.6 mph the Average Trip Length can be calculated.

Average Trip Length = Average Travel Speed * Mean Trip Length * hr / 60min = 19.6 miles/hr * 26.6 min * hr / 60min = 8.68 miles

c) Next the VMT reduction can be found with the knowledge of the Daily Work Trips and Average Trip Length.

Work VMT Reduced = 679,162 * 8.68 miles = 5,895,123

d) Based on a study conducted by STAPPA/ALAPCO an estimated percent reduction in work travel VMT was found to be 0.5 %.[8] Therefore, the VMT Reduction due to the implementation of the Public Education Campaign is:

VMT Reduction = 5,895,123 * 0.5 = 29,476

e) The final step is to calculate the emission reductions using MOBILE emission factors for the known Average Speed of 19.6 mph.

Emission Reduction = VMT * Emission Factor (g/mile) * kg/1000g
VOC Reduction = 29,476 * 2.36 g/mile * kg/1000g = 69.6 kg/day
NO_x Reduction = 29,476 * 2.46 g/mile * kg/1000g = 72.5 kg/day
CO Reduction = 29,476 * 20.38 g/mile * kg/1000g = 600.7 kg/day

7. Ramp Metering[9]

Project/Policy Description

Ramp metering is a common form of urban traffic control. It aims to reduce or eliminate operational problems resulting from freeway congestion by restricting flow to the freeway mainline. With mainline demand restricted to less than the available capacity, ramp metering tends to maintain uninterrupted, non-congested flow on the freeway. By smoothing vehicle flow, ramp metering aids in utilizing the existing freeway capacity and also reduces the probability of accidents at merge locations.

The total change in vehicle emissions due to ramp metering can be broken down into 3 elements: travel changes on the mainline, travel changes on the arterial street system, and changes in operating conditions on the ramp. All three elements are affected by the changes in traffic volumes resulting from ramp metering, including increased traffic volumes on the arterial street system. Emissions on the ramp change because of the changes in the way the ramp is operating. Ramp metering results in greater vehicle idling and greater acceleration on the ramp then is experienced without ramp metering. The travel demand forecasting model accounts for emissions resulting before the implementation of ramp metering. Therefore, the change in emissions before and after ramp metering is calculated in this analysis so that the difference can be applied to the total regional emissions from the travel demand forecasting model.

Assumptions

1) Vehicles entering at on-ramps are not experiencing delay before the implementation of ramp metering.
2) Emissions associated with the change in acceleration/deceleration on the ramps are negligible compared to emissions resulting from the increases in travel speeds on the freeway mainline.
3) Ramps are only metered until the maximum storage capacity of the ramp is met. After that time, ramp metering is turned off.
4) Queuing emissions on the ramp include that emission of the vehicle traveling on the ramp at low speeds.
5) No consideration was given to concurrent use of HOV facilities in the ramp metering corridor.

Emissions Analysis

a) Determine the freeway limits and time period for the ramp metering. Considerations for the implementing ramp metering are discussed in the*Manual on Uniform Traffic Control Devices* and the NCHRP Report 232, *Guidelines for Selection of Ramp Control Systems,* Page 52. The Florida DOT used freeway volume after the merge point and speed to determine if ramp metering was warranted as documented in the *Southeast Florida Intelligent Corridor System Ramp Metering Analysis.*

b) Obtain volumes (HPMS adjusted), capacities, and speeds of travel demand network links for all freeways, ramps, arterial cross streets and parallel cross streets which will be affected by ramp metering.

c) Calculate total emissions before ramp metering for the time period when ramp metering will be implemented (such as the peak period):

Total Emissions = $3\ (\text{LENGTH}_i \times \#\text{VEHICLES}_i \times \text{EMISSIONS RATE}_i)$

where,
i = 1 to n, and n is the number of links

d) Determine ramps to be metered and their associated storage capacity and metering rates. Ramp metering rates can be determined by first calculating the reduction in demand required to result in the desired mainline operating condition. After the mainline difference is calculated, the difference is distributed between the upstream ramps. The metering rate will be dependent on the required reduction, the demand at the particular on-ramp and the storage capacity of the ramp.
The recommended minimum metering rate is 300 vehicle per hour (for a one-lane ramp), and the recommended maximum is 900 vehicles per hour (for a one lane ramp)[10].

e) Calculate total ramp delay and the maximum individual waiting time due to the implementation of ramp metering. These can be calculated using basic queuing diagrams of number of vehicle accumulated over time (see example in Figure 1).

f) Estimate the diversion of vehicles to the parallel arterial. The number of vehicles diverting will be a function of trip length, queue length, ramp delay, and the availability and efficiency of alternate routes[11].

g)Adjust volume/capacity ratios for all links as needed to account for ramp metering (queuing on the ramp) and diversion.

h) Calculate new freeway, cross street arterial and parallel arterial speeds using the travel demand model volume/delay curves.

i) Calculate after metering emissions based on new link volumes, capacities and speeds. Freeway and arterial link emissions can be calculated as described in step 3.

j) For the on-ramps, calculate queuing emissions as follows:
Total Emissions = Total Delay x Emissions $Rate_{Idling}$

k) Calculate the difference between before metering and after metering emissions.

l) Calculate emission differences for all peak periods which are metered.

m) Apply the total difference in emissions for all peak periods to the total emissions calculated from the travel demand model output (total emissions before metering).

Caveats

1) The congestion mitigation benefits of ramp metering are conservative since the methodology is based on average annual daily traffic and no incident delay is incorporated into the analysis. Ramp metering will reduce incidents at the freeway merge and the associated vehicle delay.

2) The emissions estimate assumes that there will be no change in demand as a result of the ramp metering. The same number of vehicle trips will be made although they may be diverted to the arterial street systems. The methodology does not take into consideration latent demand that may be generated with better operations on the freeway; in the forecast years, this will be less critical due to the fact that demand will probably greatly exceed capacity.

8. University North Commuter Center[13]

The University North Commuter Center will offer information and related services to promote greater use of a range of commuter alternatives to SOV travel, including public transit, ridesharing, bicycling, walking, telecommuting and others. Services include a staffed information center, located at the University Mall, a transportable kiosk for special events within University North, a "Virtual Commuter Center" web page, and covered bicycle storage units available to participating employment sites. The analysis is as follows:

a) Estimate the number of users/participants, users. 400 new users.

b) Estimate gross vehicle trip reduction (VTR) based on mode shifts. Gross one-way vehicle trips reduced = users * mode Trip Reduction Factor (TRF).

	Users	TRF	Daily Trips	Gross Trips Reduced
New Carpooler	210	0.5	2	210
New Vanpooler	10	0.9	2	18
New Transit User	100	1	2	200
New Bicyclist	50	1	2	100
New Walker	20	1	2	40
New Telecommuter	10	1	2	20
New Compressed Work Week	0	1	2	0
New Satellite Work Center User	0	0	2	0

Total Gross Trips Reduced = 588

c) Fraction of users or participants using prior HOV and/or SOV access, in percent.

HOV% = 10.0

d) Determine net VTR. Net Vehicle One-way trips reduced = Gross VTR * (1 - HOV%/100)

Net VTR = 588 * (1 - 10/100) = 529.2

e) Determine vehicle miles of travel reducted (VMT). Average one way trip length = 11 miles/trip.

Reduced VMT = Net VTR * Average Trip Length = 529.2 * 11 = 5821.2

f) Determine daily emissions reduced. Daily Emissions Reduced = Emission Factor * Reduced VMT
CO Reduced = 5821.2 mile/day * 0.0114 kg/mile = 66.4 kg/day
NOx Reduced = 5821.2 mile/day * 0.0020 kg/mile = 11.6 kg/day
VOC Reduced = 5821.2 mile/day * 0.0014 kg/mile = 8.1 kg/day

9. Qualitative Analysis - Intermodal Transit Links[12]

Project Description

The study will examine transit system connections withing the Downtown and a Historic Area that will coordinate with other transportation components such as parking and bicycle / pedestrian facilities.

Purpose

The proposed CMAQ grant will fund a study which examines opportunities to improve the efficiency of transportation services in the Downtown and a Historic area. This project will examine optimal transfer of locations for intermodal connections between all modes of transportation including an electric streetcar, future rail transit, buses, bicyclists, pedestrians, and automobiles. Parking availability and opportunities will also be analyzed.

Project Justification

Effective intermodal connections are essential to an efficient transportation system. This study will identify optimum locations for intermodal transfers to reduce vehicular congestion, idle times in buses and automobiles, and overlapping transit service. In addition this analysis will identify ways to improve service and public use for through trips and intermodal connections by improving or streamlining routes and improving and adjusting headways. The air quality benefits derived from this project are difficult to quantify. However, for the purposes of this analysis, it is assumed that efficient intermodal connections will achieve a substantial reduction in the overall mobile source emissions in the study area for several reasons.

- Increased transit ridership attributed to better connectivity
- Amenities for pedestrians and cyclists (information kiosks, bike racks, shelters)
- Increased use of non-motorized travel
- Less vehicle idle times waiting for connections
- Reduced, shorter internal trips, less cold starts

References

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5. "Urban Freeway Congestion: Quantification of the Problem and Effectiveness of Potential Solutions", Jeffrey A. Lindley, 1987.

6. State of Tennessee Annual Report on CMAQ, *Sidewalks Near Schools in Farragut*, 1995.

7. Pinellas County MPO, *CMAQ Justification Analysis: Public Education Campaign for New Transportation Ethics, Five Projects*, February, 1995.

8. STAPPA/ALAPCO, "Meeting the 15-Percent Rate-of-Progress Requirement Under the Clean Air Act: A Menu of Options", September, 1993.

9. *Regional Ramp Metering System Analysis*, Jean Mazur and Andy Edwards, FHWA, 1997.

10. *Traffic Control Systems Handbook*, FHWA, February, 1996.

11. "Guidelines for the Selection of Ramp Control Systems", NCHRP Report 232, May, 1981.

12. CMAQ Project Review and Concurrence - Planning - FDOT District 7, *Intermodal Transit Links Analysis*, Hillsborough County Metropolitan Planning Organization, 1997.

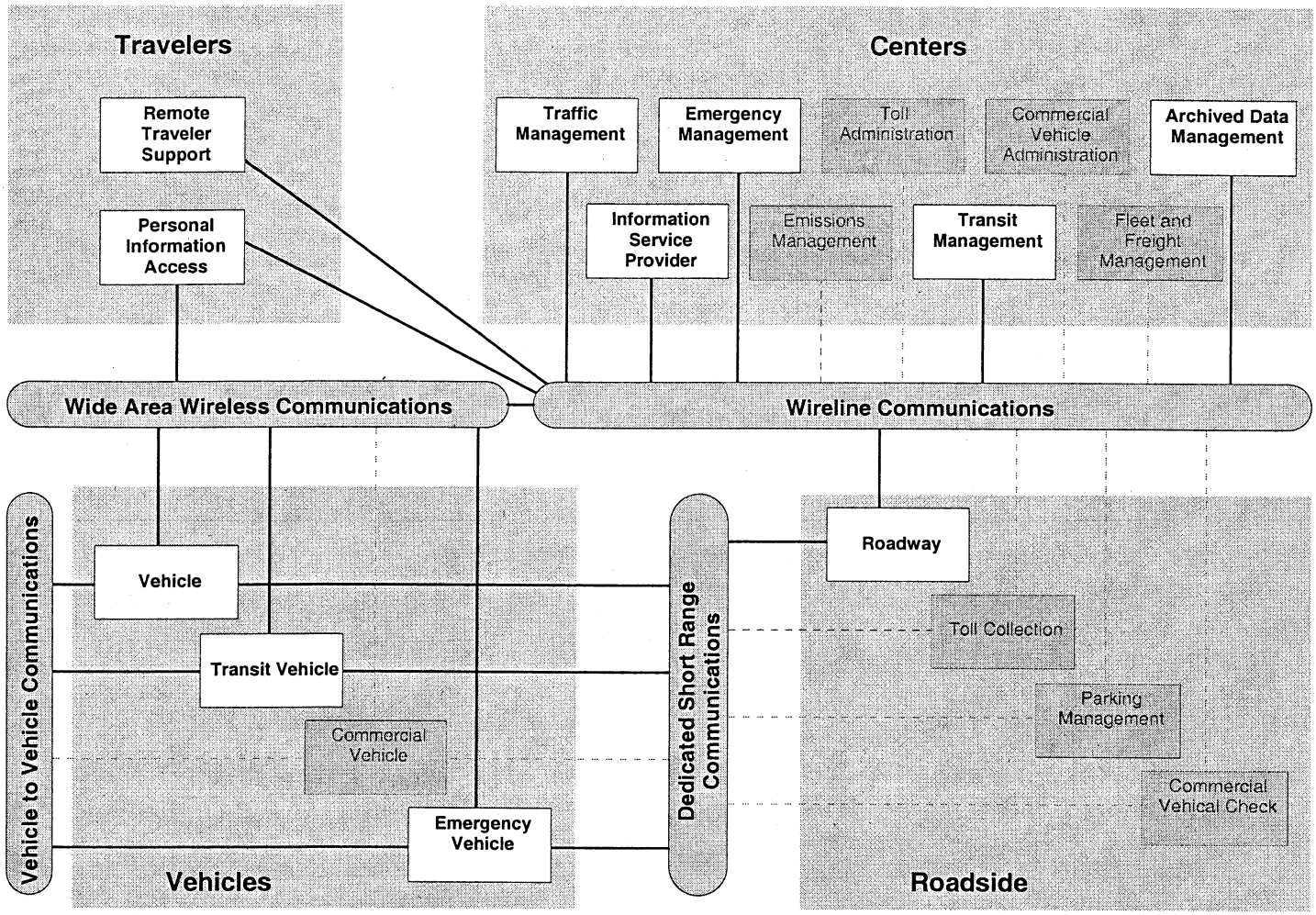
13. CMAQ Project Summary, *University North Transportation Initiative*, University of South Florida, 1998.

14. *Broward County CMAQ Justification Report Alternative Fuel Buses*, April, 1997.

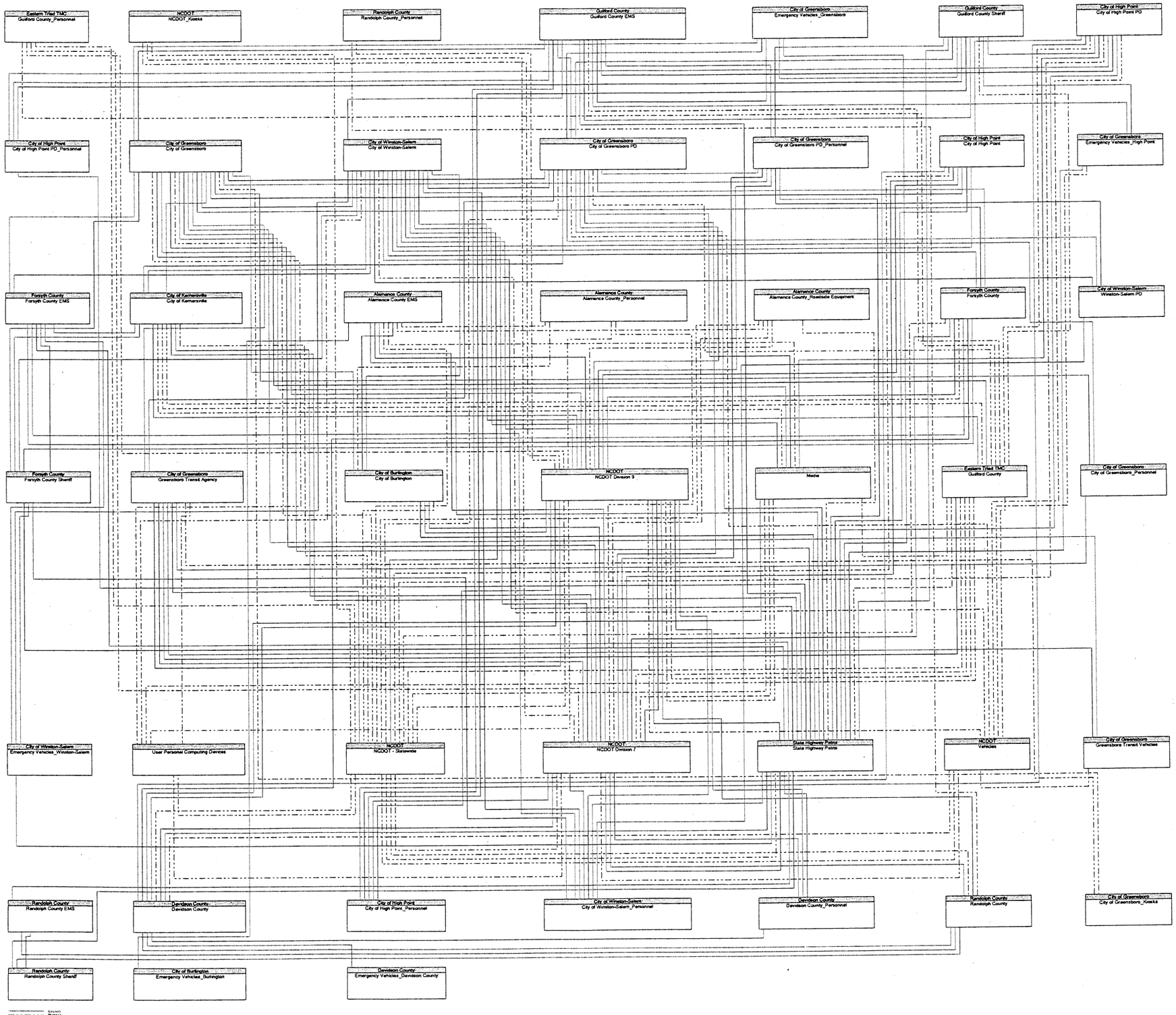
15. CMAQ Project Review and Concurrence - Planning - FDOT District 7, *Tampa Historic Electric Streetcar*, Hillsborough County Metropolitan Planning Organization, 1996.

16. *Broward County CMAQ Justification Report for Bus Bays on Oakland Park Boulevard*, April, 1997.

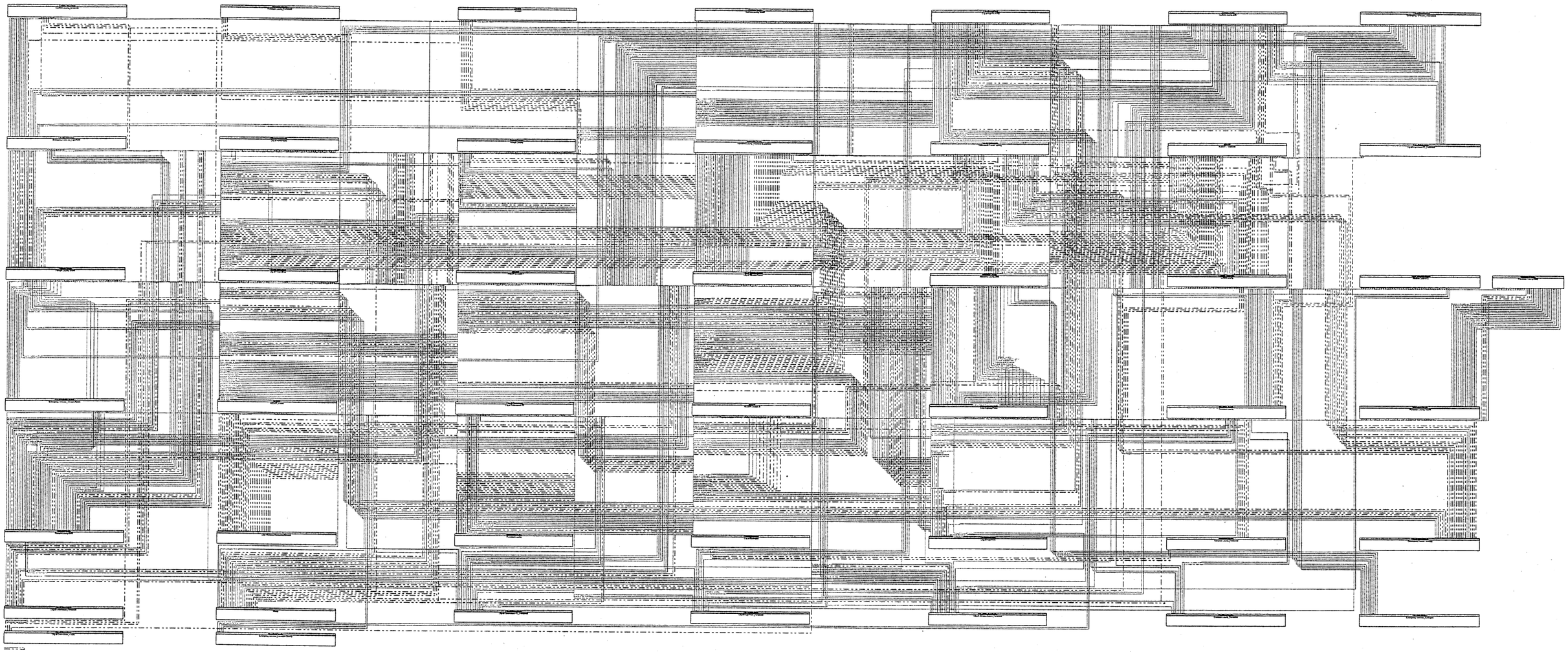
Triad Region Sausage Diagram



Triad Turbo Architecture Interconnect Diagram



Triad Turbo Architecture Flow Diagram



Inventory to Market Package Comparison

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Entity Name	Type	Element Name	
The following System(s) are in the inventory, but do not participate in any of the selected Market Packages			
Archived Data Management Subsystem	*Subsystem*	NCDOT - Statewide	
Government Reporting Systems	*Terminato*	NCDOT - Statewide	
Multimodal Crossings	*Terminato*	Randolph County	
Rail Operations	*Terminato*	Randolph County	
CVO Inspector	*Terminato*	State Highway Patrol	
Market Package: Broadcast Traveler Information			
Media	*Terminato*	Media	
Personal Information Access	*Subsystem*	User Personal Computing Devices	
Vehicle	*Subsystem*	Vehicles	
Emissions Management	*Subsystem*		Not in Inventory
Parking Management	*Subsystem*		Not in Inventory
Toll Administration	*Subsystem*		Not in Inventory
Driver	*Terminato*		Not in Inventory
Weather Service	*Terminato*		Not in Inventory
Emergency Management	*Subsystem*	Alamance County EMS	Not Selected
Traffic Management	*Subsystem*	City of Burlington	Not Selected
Emergency Management	*Subsystem*	City of Greensboro	Not Selected
Traffic Management	*Subsystem*	City of Greensboro	Not Selected
Traveler	*Terminato*	City of Greensboro	Not Selected
Emergency Management	*Subsystem*	City of Greensboro PD	Not Selected
Remote Traveler Support	*Subsystem*	City of Greensboro_Kiosks	Not Selected
Traffic Management	*Subsystem*	City of High Point	Not Selected
Emergency Management	*Subsystem*	City of High Point PD	Not Selected
Traffic Management	*Subsystem*	City of Kernersville	Not Selected
Emergency Management	*Subsystem*	City of Winston-Salem	Not Selected
Remote Traveler Support	*Subsystem*	City of Winston-Salem	Not Selected
Traffic Management	*Subsystem*	City of Winston-Salem	Not Selected
Transit Management	*Subsystem*	City of Winston-Salem	Not Selected
Traveler	*Terminato*	City of Winston-Salem	Not Selected
Emergency Management	*Subsystem*	Davidson County	Not Selected
Traffic Management	*Subsystem*	Forsyth County	Not Selected
Emergency Management	*Subsystem*	Forsyth County EMS	Not Selected
Emergency Management	*Subsystem*	Forsyth County Sheriff	Not Selected
Transit Management	*Subsystem*	Greensboro Transit Agency	Not Selected
Information Service Provider	*Subsystem*	Guilford County	Not Selected
Emergency Management	*Subsystem*	Guilford County EMS	Not Selected
Emergency Management	*Subsystem*	Guilford County Sheriff	Not Selected
ISP Operator	*Terminato*	Guilford County_Personnel	Not Selected
Information Service Provider	*Subsystem*	NCDOT - Statewide	Not Selected
Media	*Terminato*	NCDOT - Statewide	Not Selected

Entity Name	Type	Element Name	
Market Package: Broadcast Traveler Information			
Traveler	*Terminato*	NCDOT - Statewide	Not Selected
Emergency Management	*Subsystem*	NCDOT Division 7	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 7	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 7	Not Selected
Media	*Terminato*	NCDOT Division 7	Not Selected
Traveler	*Terminato*	NCDOT Division 7	Not Selected
Emergency Management	*Subsystem*	NCDOT Division 9	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 9	Not Selected
Media	*Terminato*	NCDOT Division 9	Not Selected
Traveler	*Terminato*	NCDOT Division 9	Not Selected
Remote Traveler Support	*Subsystem*	NCDOT_Kiosks	Not Selected
Traffic Management	*Subsystem*	Randolph County	Not Selected
Emergency Management	*Subsystem*	Randolph County EMS	Not Selected
Emergency Management	*Subsystem*	Randolph County Sheriff	Not Selected
Emergency Management	*Subsystem*	State Highway Patrol	Not Selected
Emergency Management	*Subsystem*	Winston-Salem PD	Not Selected
Market Package: Demand Response Transit Operations			
Traffic Management	*Subsystem*	City of Greensboro	
Transit Fleet Manager	*Terminato*	City of Greensboro_Personnel	
Traffic Management	*Subsystem*	City of Winston-Salem	
Transit Management	*Subsystem*	City of Winston-Salem	
Transit Fleet Manager	*Terminato*	City of Winston-Salem_Personnel	
Transit Vehicle Subsystem	*Subsystem*	Greensboro Transit Vehicles	
Transit Driver	*Terminato*		Not in Inventory
Weather Service	*Terminato*		Not in Inventory
Traffic Management	*Subsystem*	City of Burlington	Not Selected
Traffic Management	*Subsystem*	City of High Point	Not Selected
Traffic Management	*Subsystem*	City of Kernersville	Not Selected
Traffic Management	*Subsystem*	Forsyth County	Not Selected
Transit Management	*Subsystem*	Greensboro Transit Agency	Not Selected
Information Service Provider	*Subsystem*	Guilford County	Not Selected
Information Service Provider	*Subsystem*	NCDOT - Statewide	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 7	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 7	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	Randolph County	Not Selected
Market Package: Emergency Response			
Emergency Management	*Subsystem*	City of Greensboro	
Traffic Management	*Subsystem*	City of Greensboro	
Emergency Management	*Subsystem*	City of Greensboro PD	
Emergency Vehicle Subsystem	*Subsystem*	City of Greensboro PD	

Market Package: Emergency Response

Entity Name	Type	Element Name	
Emergency Personnel	*Terminato*	City of Greensboro PD	
Emergency System Operator	*Terminato*	City of Greensboro PD	
Emergency Telecommunications System	*Terminato*	City of Greensboro PD	
Emergency System Operator	*Terminato*	City of Greensboro PD_Personnel	
Emergency Management	*Subsystem*	City of High Point PD	
Emergency Vehicle Subsystem	*Subsystem*	City of High Point PD	
Emergency Personnel	*Terminato*	City of High Point PD	
Emergency System Operator	*Terminato*	City of High Point PD	
Emergency Telecommunications System	*Terminato*	City of High Point PD	
Emergency System Operator	*Terminato*	City of High Point PD_Personnel	
Emergency System Operator	*Terminato*	City of High Point_Personnel	
Emergency Management	*Subsystem*	City of Winston-Salem	
Traffic Management	*Subsystem*	City of Winston-Salem	
Transit Management	*Subsystem*	City of Winston-Salem	
Emergency System Operator	*Terminato*	City of Winston-Salem_Personnel	
Emergency Management	*Subsystem*	Davidson County	
Emergency System Operator	*Terminato*	Davidson County_Personnel	
Emergency Vehicle Subsystem	*Subsystem*	Emergency Vehicles_High Point	
Map Update Provider	*Terminato*		Not in Inventory
Weather Service	*Terminato*		Not in Inventory
Emergency Management	*Subsystem*	Alamance County EMS	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Alamance County EMS	Not Selected
Emergency Personnel	*Terminato*	Alamance County EMS	Not Selected
Emergency System Operator	*Terminato*	Alamance County EMS	Not Selected
Emergency Telecommunications System	*Terminato*	Alamance County EMS	Not Selected
Traffic Management	*Subsystem*	City of Burlington	Not Selected
Traffic Management	*Subsystem*	City of High Point	Not Selected
Traffic Management	*Subsystem*	City of Kernersville	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Emergency Vehicles_Burlington	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Emergency Vehicles_Davidson County	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Emergency Vehicles_Greensboro	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Emergency Vehicles_Winston-Salem	Not Selected
Traffic Management	*Subsystem*	Forsyth County	Not Selected
Emergency Management	*Subsystem*	Forsyth County EMS	Not Selected
Emergency Management	*Subsystem*	Forsyth County Sheriff	Not Selected
Emergency Personnel	*Terminato*	Forsyth County Sheriff	Not Selected
Transit Management	*Subsystem*	Greensboro Transit Agency	Not Selected
Emergency Management	*Subsystem*	Guilford County EMS	Not Selected
Emergency Management	*Subsystem*	Guilford County Sheriff	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Guilford County Sheriff	Not Selected
Emergency Personnel	*Terminato*	Guilford County Sheriff	Not Selected
Emergency System Operator	*Terminato*	Guilford County Sheriff	Not Selected
Emergency Telecommunications System	*Terminato*	Guilford County Sheriff	Not Selected
Media	*Terminato*	Media	Not Selected

Entity Name	Type	Element Name	
Market Package: Emergency Response			
Media	*Terminato*	NCDOT - Statewide	Not Selected
Emergency Management	*Subsystem*	NCDOT Division 7	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 7	Not Selected
Media	*Terminato*	NCDOT Division 7	Not Selected
Emergency Management	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 9	Not Selected
Media	*Terminato*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	Randolph County	Not Selected
Emergency Management	*Subsystem*	Randolph County EMS	Not Selected
Emergency Management	*Subsystem*	Randolph County Sheriff	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Randolph County Sheriff	Not Selected
Emergency Personnel	*Terminato*	Randolph County Sheriff	Not Selected
Emergency System Operator	*Terminato*	Randolph County Sheriff	Not Selected
Emergency Telecommunications System	*Terminato*	Randolph County Sheriff	Not Selected
Emergency Management	*Subsystem*	State Highway Patrol	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	State Highway Patrol	Not Selected
Emergency Personnel	*Terminato*	State Highway Patrol	Not Selected
Emergency Telecommunications System	*Terminato*	State Highway Patrol	Not Selected
Emergency Management	*Subsystem*	Winston-Salem PD	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Winston-Salem PD	Not Selected
Emergency Personnel	*Terminato*	Winston-Salem PD	Not Selected
Emergency System Operator	*Terminato*	Winston-Salem PD	Not Selected
Emergency Telecommunications System	*Terminato*	Winston-Salem PD	Not Selected
Market Package: Emergency Routing			
Emergency Management	*Subsystem*	City of Greensboro PD	
Emergency Vehicle Subsystem	*Subsystem*	City of Greensboro PD	
Emergency Personnel	*Terminato*	City of Greensboro PD	
Emergency System Operator	*Terminato*	City of Greensboro PD	
Emergency System Operator	*Terminato*	City of Greensboro PD_Personnel	
Emergency Management	*Subsystem*	City of High Point PD	
Emergency Vehicle Subsystem	*Subsystem*	City of High Point PD	
Emergency Personnel	*Terminato*	City of High Point PD	
Emergency System Operator	*Terminato*	City of High Point PD	
Emergency System Operator	*Terminato*	City of High Point PD_Personnel	
Emergency System Operator	*Terminato*	City of High Point_Personnel	
Emergency Management	*Subsystem*	City of Winston-Salem	
Traffic Management	*Subsystem*	City of Winston-Salem	
Emergency System Operator	*Terminato*	City of Winston-Salem_Personnel	
Emergency Vehicle Subsystem	*Subsystem*	Emergency Vehicles_High Point	
Map Update Provider	*Terminato*		Not in Inventory
Emergency Management	*Subsystem*	Alamance County EMS	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Alamance County EMS	Not Selected
Emergency Personnel	*Terminato*	Alamance County EMS	Not Selected

Entity Name	Type	Element Name	
Market Package: Emergency Routing			
Emergency System Operator	*Terminato*	Alamance County EMS	Not Selected
Roadway Subsystem	*Subsystem*	Alamance County_Roadside Equipment	Not Selected
Traffic Management	*Subsystem*	City of Burlington	Not Selected
Emergency Management	*Subsystem*	City of Greensboro	Not Selected
Traffic Management	*Subsystem*	City of Greensboro	Not Selected
Traffic Management	*Subsystem*	City of High Point	Not Selected
Traffic Management	*Subsystem*	City of Kernersville	Not Selected
Emergency Management	*Subsystem*	Davidson County	Not Selected
Emergency System Operator	*Terminato*	Davidson County_Personnel	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Emergency Vehicles_Burlington	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Emergency Vehicles_Davidson County	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Emergency Vehicles_Greensboro	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Emergency Vehicles_Winston-Salem	Not Selected
Traffic Management	*Subsystem*	Forsyth County	Not Selected
Emergency Management	*Subsystem*	Forsyth County EMS	Not Selected
Emergency Management	*Subsystem*	Forsyth County Sheriff	Not Selected
Emergency Personnel	*Terminato*	Forsyth County Sheriff	Not Selected
Emergency Management	*Subsystem*	Guilford County EMS	Not Selected
Emergency Management	*Subsystem*	Guilford County Sheriff	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Guilford County Sheriff	Not Selected
Emergency Personnel	*Terminato*	Guilford County Sheriff	Not Selected
Emergency System Operator	*Terminato*	Guilford County Sheriff	Not Selected
Emergency Management	*Subsystem*	NCDOT Division 7	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 7	Not Selected
Emergency Management	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	Randolph County	Not Selected
Emergency Management	*Subsystem*	Randolph County EMS	Not Selected
Emergency Management	*Subsystem*	Randolph County Sheriff	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Randolph County Sheriff	Not Selected
Emergency Personnel	*Terminato*	Randolph County Sheriff	Not Selected
Emergency System Operator	*Terminato*	Randolph County Sheriff	Not Selected
Emergency Management	*Subsystem*	State Highway Patrol	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	State Highway Patrol	Not Selected
Emergency Personnel	*Terminato*	State Highway Patrol	Not Selected
Vehicle	*Subsystem*	Vehicles	Not Selected
Emergency Management	*Subsystem*	Winston-Salem PD	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Winston-Salem PD	Not Selected
Emergency Personnel	*Terminato*	Winston-Salem PD	Not Selected
Emergency System Operator	*Terminato*	Winston-Salem PD	Not Selected
Market Package: Freeway Control			
Traffic Operations Personnel	*Terminato*	Alamance County_Personnel	
Roadway Subsystem	*Subsystem*	Alamance County_Roadside Equipment	
Traffic Management	*Subsystem*	Randolph County	
Traffic Operations Personnel	*Terminato*	Randolph County_Personnel	

Entity Name	Type	Element Name	
Market Package: Freeway Control			
Construction and Maintenance	*Terminato*		Not in Inventory
Driver	*Terminato*		Not in Inventory
Traffic	*Terminato*		Not in Inventory
Traffic Management	*Subsystem*	City of Burlington	Not Selected
Traffic Management	*Subsystem*	City of Greensboro	Not Selected
Traffic Management	*Subsystem*	City of High Point	Not Selected
Traffic Management	*Subsystem*	City of Kernersville	Not Selected
Traffic Management	*Subsystem*	City of Winston-Salem	Not Selected
Traffic Management	*Subsystem*	Forsyth County	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 7	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 9	Not Selected
Market Package: HAZMAT Management			
Emergency Management	*Subsystem*	City of Greensboro PD	
Emergency Management	*Subsystem*	City of High Point PD	
Emergency Management	*Subsystem*	City of Winston-Salem	
Traffic Management	*Subsystem*	City of Winston-Salem	
Emergency Management	*Subsystem*	Davidson County	
Commercial Vehicle Administration	*Subsystem*		Not in Inventory
Commercial Vehicle Subsystem	*Subsystem*		Not in Inventory
Fleet and Freight Management	*Subsystem*		Not in Inventory
Basic Vehicle	*Terminato*		Not in Inventory
Commercial Vehicle	*Terminato*		Not in Inventory
Emergency Management	*Subsystem*	Alamance County EMS	Not Selected
Traffic Management	*Subsystem*	City of Burlington	Not Selected
Emergency Management	*Subsystem*	City of Greensboro	Not Selected
Traffic Management	*Subsystem*	City of Greensboro	Not Selected
Traffic Management	*Subsystem*	City of High Point	Not Selected
Traffic Management	*Subsystem*	City of Kernersville	Not Selected
Traffic Management	*Subsystem*	Forsyth County	Not Selected
Emergency Management	*Subsystem*	Forsyth County EMS	Not Selected
Emergency Management	*Subsystem*	Forsyth County Sheriff	Not Selected
Emergency Management	*Subsystem*	Guilford County EMS	Not Selected
Emergency Management	*Subsystem*	Guilford County Sheriff	Not Selected
Emergency Management	*Subsystem*	NCDOT Division 7	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 7	Not Selected
Emergency Management	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	Randolph County	Not Selected
Emergency Management	*Subsystem*	Randolph County EMS	Not Selected
Emergency Management	*Subsystem*	Randolph County Sheriff	Not Selected
Emergency Management	*Subsystem*	State Highway Patrol	Not Selected
Vehicle	*Subsystem*	Vehicles	Not Selected
Emergency Management	*Subsystem*	Winston-Salem PD	Not Selected

Entity Name	Type	Element Name	
Market Package: In Vehicle Signing			
Driver	*Terminato*		Not in Inventory
Roadway Subsystem	*Subsystem*	Alamance County_Roadside Equipment	Not Selected
Traffic Management	*Subsystem*	City of Burlington	Not Selected
Traffic Management	*Subsystem*	City of Greensboro	Not Selected
Traffic Management	*Subsystem*	City of High Point	Not Selected
Traffic Management	*Subsystem*	City of Kernersville	Not Selected
Traffic Management	*Subsystem*	City of Winston-Salem	Not Selected
Traffic Management	*Subsystem*	Forsyth County	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 7	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	Randolph County	Not Selected
Vehicle	*Subsystem*	Vehicles	Not Selected
Market Package: Incident Management System			
Emergency Management	*Subsystem*	Alamance County EMS	
Emergency Vehicle Subsystem	*Subsystem*	Alamance County EMS	
Emergency System Operator	*Terminato*	Alamance County EMS	
Traffic Operations Personnel	*Terminato*	Alamance County_Personnel	
Roadway Subsystem	*Subsystem*	Alamance County_Roadside Equipment	
Emergency Management	*Subsystem*	City of Greensboro PD	
Emergency Vehicle Subsystem	*Subsystem*	City of Greensboro PD	
Emergency System Operator	*Terminato*	City of Greensboro PD	
Emergency System Operator	*Terminato*	City of Greensboro PD_Personnel	
Emergency Management	*Subsystem*	City of High Point PD	
Emergency Vehicle Subsystem	*Subsystem*	City of High Point PD	
Emergency System Operator	*Terminato*	City of High Point PD	
Emergency System Operator	*Terminato*	City of High Point PD_Personnel	
Emergency Vehicle Subsystem	*Subsystem*	Emergency Vehicles_High Point	
Construction and Maintenance	*Terminato*		Not in Inventory
Event Promoters	*Terminato*		Not in Inventory
Map Update Provider	*Terminato*		Not in Inventory
Traffic	*Terminato*		Not in Inventory
Weather Service	*Terminato*		Not in Inventory
Traffic Management	*Subsystem*	City of Burlington	Not Selected
Emergency Management	*Subsystem*	City of Greensboro	Not Selected
Traffic Management	*Subsystem*	City of Greensboro	Not Selected
Traffic Management	*Subsystem*	City of High Point	Not Selected
Emergency System Operator	*Terminato*	City of High Point_Personnel	Not Selected
Traffic Management	*Subsystem*	City of Kernersville	Not Selected
Emergency Management	*Subsystem*	City of Winston-Salem	Not Selected
Traffic Management	*Subsystem*	City of Winston-Salem	Not Selected
Emergency System Operator	*Terminato*	City of Winston-Salem_Personnel	Not Selected
Emergency Management	*Subsystem*	Davidson County	Not Selected
Emergency System Operator	*Terminato*	Davidson County_Personnel	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Emergency Vehicles_Burlington	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Emergency Vehicles_Davidson County	Not Selected

Entity Name	Type	Element Name	
Market Package: Incident Management System			
Emergency Vehicle Subsystem	*Subsystem*	Emergency Vehicles_Greensboro	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Emergency Vehicles_Winston-Salem	Not Selected
Traffic Management	*Subsystem*	Forsyth County	Not Selected
Emergency Management	*Subsystem*	Forsyth County EMS	Not Selected
Emergency Management	*Subsystem*	Forsyth County Sheriff	Not Selected
Information Service Provider	*Subsystem*	Guilford County	Not Selected
Emergency Management	*Subsystem*	Guilford County EMS	Not Selected
Emergency Management	*Subsystem*	Guilford County Sheriff	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Guilford County Sheriff	Not Selected
Emergency System Operator	*Terminato*	Guilford County Sheriff	Not Selected
Media	*Terminato*	Media	Not Selected
Information Service Provider	*Subsystem*	NCDOT - Statewide	Not Selected
Media	*Terminato*	NCDOT - Statewide	Not Selected
Emergency Management	*Subsystem*	NCDOT Division 7	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 7	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 7	Not Selected
Media	*Terminato*	NCDOT Division 7	Not Selected
Emergency Management	*Subsystem*	NCDOT Division 9	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 9	Not Selected
Media	*Terminato*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	Randolph County	Not Selected
Emergency Management	*Subsystem*	Randolph County EMS	Not Selected
Emergency Management	*Subsystem*	Randolph County Sheriff	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Randolph County Sheriff	Not Selected
Emergency System Operator	*Terminato*	Randolph County Sheriff	Not Selected
Traffic Operations Personnel	*Terminato*	Randolph County_Personnel	Not Selected
Emergency Management	*Subsystem*	State Highway Patrol	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	State Highway Patrol	Not Selected
Emergency Management	*Subsystem*	Winston-Salem PD	Not Selected
Emergency Vehicle Subsystem	*Subsystem*	Winston-Salem PD	Not Selected
Emergency System Operator	*Terminato*	Winston-Salem PD	Not Selected
Market Package: ISP Based Route Guidance			
Personal Information Access	*Subsystem*	User Personal Computing Devices	
Driver	*Terminato*		Not in Inventory
Location Data Source	*Terminato*		Not in Inventory
Map Update Provider	*Terminato*		Not in Inventory
Traffic Management	*Subsystem*	City of Burlington	Not Selected
Traffic Management	*Subsystem*	City of Greensboro	Not Selected
Traveler	*Terminato*	City of Greensboro	Not Selected
Remote Traveler Support	*Subsystem*	City of Greensboro_Kiosks	Not Selected
Traffic Management	*Subsystem*	City of High Point	Not Selected
Traffic Management	*Subsystem*	City of Kernersville	Not Selected
Remote Traveler Support	*Subsystem*	City of Winston-Salem	Not Selected
Traffic Management	*Subsystem*	City of Winston-Salem	Not Selected

Entity Name	Type	Element Name	
Market Package: ISP Based Route Guidance			
Transit Management	*Subsystem*	City of Winston-Salem	Not Selected
Traveler	*Terminato*	City of Winston-Salem	Not Selected
Traffic Management	*Subsystem*	Forsyth County	Not Selected
Transit Management	*Subsystem*	Greensboro Transit Agency	Not Selected
Information Service Provider	*Subsystem*	Guilford County	Not Selected
ISP Operator	*Terminato*	Guilford County_Personnel	Not Selected
Information Service Provider	*Subsystem*	NCDOT - Statewide	Not Selected
Traveler	*Terminato*	NCDOT - Statewide	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 7	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 7	Not Selected
Traveler	*Terminato*	NCDOT Division 7	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 9	Not Selected
Traveler	*Terminato*	NCDOT Division 9	Not Selected
Remote Traveler Support	*Subsystem*	NCDOT_Kiosks	Not Selected
Traffic Management	*Subsystem*	Randolph County	Not Selected
Vehicle	*Subsystem*	Vehicles	Not Selected
Market Package: Network Surveillance			
Traffic Operations Personnel	*Terminato*	Alamance County_Personnel	
Roadway Subsystem	*Subsystem*	Alamance County_Roadside Equipment	
Construction and Maintenance	*Terminato*		Not in Inventory
Map Update Provider	*Terminato*		Not in Inventory
Traffic	*Terminato*		Not in Inventory
Traffic Management	*Subsystem*	City of Burlington	Not Selected
Traffic Management	*Subsystem*	City of Greensboro	Not Selected
Traffic Management	*Subsystem*	City of High Point	Not Selected
Traffic Management	*Subsystem*	City of Kernersville	Not Selected
Traffic Management	*Subsystem*	City of Winston-Salem	Not Selected
Traffic Management	*Subsystem*	Forsyth County	Not Selected
Information Service Provider	*Subsystem*	Guilford County	Not Selected
Information Service Provider	*Subsystem*	NCDOT - Statewide	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 7	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 7	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	Randolph County	Not Selected
Traffic Operations Personnel	*Terminato*	Randolph County_Personnel	Not Selected
Market Package: Probe Surveillance			
Toll Administration	*Subsystem*		Not in Inventory
Location Data Source	*Terminato*		Not in Inventory
Roadway Subsystem	*Subsystem*	Alamance County_Roadside Equipment	Not Selected
Traffic Management	*Subsystem*	City of Burlington	Not Selected
Traffic Management	*Subsystem*	City of Greensboro	Not Selected

Entity Name	Type	Element Name	
Market Package: Probe Surveillance			
Traffic Management	*Subsystem*	City of High Point	Not Selected
Traffic Management	*Subsystem*	City of Kernersville	Not Selected
Traffic Management	*Subsystem*	City of Winston-Salem	Not Selected
Traffic Management	*Subsystem*	Forsyth County	Not Selected
Information Service Provider	*Subsystem*	Guilford County	Not Selected
Information Service Provider	*Subsystem*	NCDOT - Statewide	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 7	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 7	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	Randolph County	Not Selected
Vehicle	*Subsystem*	Vehicles	Not Selected
Market Package: Regional Traffic Control			
Traffic Operations Personnel	*Terminato*	Alamance County_Personnel	Not Selected
Roadway Subsystem	*Subsystem*	Alamance County_Roadside Equipment	Not Selected
Traffic Management	*Subsystem*	City of Burlington	Not Selected
Traffic Management	*Subsystem*	City of Greensboro	Not Selected
Traffic Management	*Subsystem*	City of High Point	Not Selected
Traffic Management	*Subsystem*	City of Kernersville	Not Selected
Traffic Management	*Subsystem*	City of Winston-Salem	Not Selected
Traffic Management	*Subsystem*	Forsyth County	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 7	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	Randolph County	Not Selected
Traffic Operations Personnel	*Terminato*	Randolph County_Personnel	Not Selected
Market Package: Surface Street Control			
Construction and Maintenance	*Terminato*		Not in Inventory
Driver	*Terminato*		Not in Inventory
Pedestrians	*Terminato*		Not in Inventory
Traffic	*Terminato*		Not in Inventory
Emergency Management	*Subsystem*	Alamance County EMS	Not Selected
Traffic Operations Personnel	*Terminato*	Alamance County_Personnel	Not Selected
Roadway Subsystem	*Subsystem*	Alamance County_Roadside Equipment	Not Selected
Traffic Management	*Subsystem*	City of Burlington	Not Selected
Emergency Management	*Subsystem*	City of Greensboro	Not Selected
Traffic Management	*Subsystem*	City of Greensboro	Not Selected
Emergency Management	*Subsystem*	City of Greensboro PD	Not Selected
Traffic Management	*Subsystem*	City of High Point	Not Selected
Emergency Management	*Subsystem*	City of High Point PD	Not Selected
Traffic Management	*Subsystem*	City of Kernersville	Not Selected
Emergency Management	*Subsystem*	City of Winston-Salem	Not Selected
Traffic Management	*Subsystem*	City of Winston-Salem	Not Selected
Emergency Management	*Subsystem*	Davidson County	Not Selected

Entity Name	Type	Element Name	
Market Package: Surface Street Control			
Traffic Management	*Subsystem*	Forsyth County	Not Selected
Emergency Management	*Subsystem*	Forsyth County EMS	Not Selected
Emergency Management	*Subsystem*	Forsyth County Sheriff	Not Selected
Emergency Management	*Subsystem*	Guilford County EMS	Not Selected
Emergency Management	*Subsystem*	Guilford County Sheriff	Not Selected
Emergency Management	*Subsystem*	NCDOT Division 7	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 7	Not Selected
Emergency Management	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	Randolph County	Not Selected
Emergency Management	*Subsystem*	Randolph County EMS	Not Selected
Emergency Management	*Subsystem*	Randolph County Sheriff	Not Selected
Traffic Operations Personnel	*Terminato*	Randolph County_Personnel	Not Selected
Emergency Management	*Subsystem*	State Highway Patrol	Not Selected
Emergency Management	*Subsystem*	Winston-Salem PD	Not Selected
Market Package: Traffic Information Dissemination			
Basic Vehicle	*Terminato*		Not in Inventory
Driver	*Terminato*		Not in Inventory
Pedestrians	*Terminato*		Not in Inventory
Emergency Management	*Subsystem*	Alamance County EMS	Not Selected
Traffic Operations Personnel	*Terminato*	Alamance County_Personnel	Not Selected
Roadway Subsystem	*Subsystem*	Alamance County_Roadside Equipment	Not Selected
Traffic Management	*Subsystem*	City of Burlington	Not Selected
Emergency Management	*Subsystem*	City of Greensboro	Not Selected
Traffic Management	*Subsystem*	City of Greensboro	Not Selected
Emergency Management	*Subsystem*	City of Greensboro PD	Not Selected
Traffic Management	*Subsystem*	City of High Point	Not Selected
Emergency Management	*Subsystem*	City of High Point PD	Not Selected
Traffic Management	*Subsystem*	City of Kernersville	Not Selected
Emergency Management	*Subsystem*	City of Winston-Salem	Not Selected
Traffic Management	*Subsystem*	City of Winston-Salem	Not Selected
Transit Management	*Subsystem*	City of Winston-Salem	Not Selected
Emergency Management	*Subsystem*	Davidson County	Not Selected
Traffic Management	*Subsystem*	Forsyth County	Not Selected
Emergency Management	*Subsystem*	Forsyth County EMS	Not Selected
Emergency Management	*Subsystem*	Forsyth County Sheriff	Not Selected
Transit Management	*Subsystem*	Greensboro Transit Agency	Not Selected
Information Service Provider	*Subsystem*	Guilford County	Not Selected
Emergency Management	*Subsystem*	Guilford County EMS	Not Selected
Emergency Management	*Subsystem*	Guilford County Sheriff	Not Selected
Media	*Terminato*	Media	Not Selected
Information Service Provider	*Subsystem*	NCDOT - Statewide	Not Selected
Media	*Terminato*	NCDOT - Statewide	Not Selected
Emergency Management	*Subsystem*	NCDOT Division 7	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 7	Not Selected

Entity Name	Type	Element Name	
Market Package: Traffic Information Dissemination			
Traffic Management	*Subsystem*	NCDOT Division 7	Not Selected
Media	*Terminato*	NCDOT Division 7	Not Selected
Emergency Management	*Subsystem*	NCDOT Division 9	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 9	Not Selected
Media	*Terminato*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	Randolph County	Not Selected
Emergency Management	*Subsystem*	Randolph County EMS	Not Selected
Emergency Management	*Subsystem*	Randolph County Sheriff	Not Selected
Traffic Operations Personnel	*Terminato*	Randolph County_Personnel	Not Selected
Emergency Management	*Subsystem*	State Highway Patrol	Not Selected
Emergency Management	*Subsystem*	Winston-Salem PD	Not Selected
Market Package: Transit Fixed-Route Operations			
Traffic Management	*Subsystem*	City of Greensboro	
Transit Fleet Manager	*Terminato*	City of Greensboro_Personnel	
Transit System Operators	*Terminato*	City of Greensboro_Personnel	
Traffic Management	*Subsystem*	City of Winston-Salem	
Transit Management	*Subsystem*	City of Winston-Salem	
Transit Fleet Manager	*Terminato*	City of Winston-Salem_Personnel	
Transit System Operators	*Terminato*	City of Winston-Salem_Personnel	
Transit Vehicle Subsystem	*Subsystem*	Greensboro Transit Vehicles	
Transit Driver	*Terminato*		Not in Inventory
Weather Service	*Terminato*		Not in Inventory
Traffic Management	*Subsystem*	City of Burlington	Not Selected
Traffic Management	*Subsystem*	City of High Point	Not Selected
Traffic Management	*Subsystem*	City of Kernersville	Not Selected
Traffic Management	*Subsystem*	Forsyth County	Not Selected
Transit Management	*Subsystem*	Greensboro Transit Agency	Not Selected
Information Service Provider	*Subsystem*	Guilford County	Not Selected
Information Service Provider	*Subsystem*	NCDOT - Statewide	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 7	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 7	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 9	Not Selected
Traffic Management	*Subsystem*	Randolph County	Not Selected
Market Package: Transit Maintenance			
Transit Fleet Manager	*Terminato*	City of Greensboro_Personnel	
Transit Maintenance Personnel	*Terminato*		Not in Inventory
Transit Management	*Subsystem*	City of Winston-Salem	Not Selected
Transit Fleet Manager	*Terminato*	City of Winston-Salem_Personnel	Not Selected
Transit Management	*Subsystem*	Greensboro Transit Agency	Not Selected
Transit Vehicle Subsystem	*Subsystem*	Greensboro Transit Vehicles	Not Selected

Entity Name	Type	Element Name	
Market Package: Transit Passenger and Fare Management			
Remote Traveler Support	*Subsystem*	City of Greensboro_Kiosks	
Transit Vehicle Subsystem	*Subsystem*	Greensboro Transit Vehicles	
Financial Institution	*Terminato*		Not in Inventory
Payment Instrument	*Terminato*		Not in Inventory
Transit User	*Terminato*		Not in Inventory
Enforcement Agency	*Terminato*	Alamance County EMS	Not Selected
Enforcement Agency	*Terminato*	City of Greensboro PD	Not Selected
Transit System Operators	*Terminato*	City of Greensboro_Personnel	Not Selected
Enforcement Agency	*Terminato*	City of High Point PD	Not Selected
Remote Traveler Support	*Subsystem*	City of Winston-Salem	Not Selected
Transit Management	*Subsystem*	City of Winston-Salem	Not Selected
Transit System Operators	*Terminato*	City of Winston-Salem_Personnel	Not Selected
Enforcement Agency	*Terminato*	Forsyth County Sheriff	Not Selected
Transit Management	*Subsystem*	Greensboro Transit Agency	Not Selected
Information Service Provider	*Subsystem*	Guilford County	Not Selected
Enforcement Agency	*Terminato*	Guilford County Sheriff	Not Selected
Information Service Provider	*Subsystem*	NCDOT - Statewide	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 7	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 9	Not Selected
Remote Traveler Support	*Subsystem*	NCDOT_Kiosks	Not Selected
Enforcement Agency	*Terminato*	Randolph County Sheriff	Not Selected
Enforcement Agency	*Terminato*	State Highway Patrol	Not Selected
Enforcement Agency	*Terminato*	Winston-Salem PD	Not Selected
Market Package: Transit Traveler Information			
Remote Traveler Support	*Subsystem*	City of Winston-Salem	
Traffic Management	*Subsystem*	City of Winston-Salem	
Transit Management	*Subsystem*	City of Winston-Salem	
Personal Information Access	*Subsystem*	User Personal Computing Devices	
Transit User	*Terminato*		Not in Inventory
Traffic Management	*Subsystem*	City of Burlington	Not Selected
Traffic Management	*Subsystem*	City of Greensboro	Not Selected
Remote Traveler Support	*Subsystem*	City of Greensboro_Kiosks	Not Selected
Traffic Management	*Subsystem*	City of High Point	Not Selected
Traffic Management	*Subsystem*	City of Kernersville	Not Selected
Traffic Management	*Subsystem*	Forsyth County	Not Selected
Transit Management	*Subsystem*	Greensboro Transit Agency	Not Selected
Transit Vehicle Subsystem	*Subsystem*	Greensboro Transit Vehicles	Not Selected
Information Service Provider	*Subsystem*	Guilford County	Not Selected
Media	*Terminato*	Media	Not Selected
Information Service Provider	*Subsystem*	NCDOT - Statewide	Not Selected
Media	*Terminato*	NCDOT - Statewide	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 7	Not Selected
Traffic Management	*Subsystem*	NCDOT Division 7	Not Selected
Media	*Terminato*	NCDOT Division 7	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 9	Not Selected

Entity Name	Type	Element Name	
Market Package: Transit Traveler Information			
Traffic Management	*Subsystem*	NCDOT Division 9	Not Selected
Media	*Terminato*	NCDOT Division 9	Not Selected
Remote Traveler Support	*Subsystem*	NCDOT_Kiosks	Not Selected
Traffic Management	*Subsystem*	Randolph County	Not Selected
Vehicle	*Subsystem*	Vehicles	Not Selected
Market Package: Transit Vehicle Tracking			
Transit Vehicle Subsystem	*Subsystem*	Greensboro Transit Vehicles	
Location Data Source	*Terminato*		Not in Inventory
Map Update Provider	*Terminato*		Not in Inventory
Transit Vehicle	*Terminato*		Not in Inventory
Transit Management	*Subsystem*	City of Winston-Salem	Not Selected
Transit Management	*Subsystem*	Greensboro Transit Agency	Not Selected
Information Service Provider	*Subsystem*	Guilford County	Not Selected
Information Service Provider	*Subsystem*	NCDOT - Statewide	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 7	Not Selected
Information Service Provider	*Subsystem*	NCDOT Division 9	Not Selected
Vehicle	*Subsystem*	Vehicles	Not Selected

Market Packages Report

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Market Packages for Region Triad

Market Package	Element(s)	
Demand Response Transit Operations (APTS3) -- Existing		
	City of Burlington	-- Not Selected
	City of Greensboro	
	City of Greensboro_Personnel	
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	
	City of Winston-Salem_Personnel	
	Forsyth County	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Greensboro Transit Vehicles	
	Guilford County	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
Emergency Response (EM1) -- Existing		
	Alamance County EMS	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	
	City of Greensboro PD	
	City of Greensboro PD_Personnel	
	City of High Point	-- Not Selected
	City of High Point PD	
	City of High Point PD_Personnel	
	City of High Point_Personnel	
	City of Kernersville	-- Not Selected
	City of Winston-Salem	
	City of Winston-Salem_Personnel	
	Davidson County	
	Davidson County_Personnel	
	Emergency Vehicles_Burlington	-- Not Selected
	Emergency Vehicles_Davidson County	-- Not Selected
	Emergency Vehicles_Greensboro	-- Not Selected
	Emergency Vehicles_High Point	
	Emergency Vehicles_Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	Forsyth County EMS	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Guilford County EMS	-- Not Selected
	Guilford County Sheriff	-- Not Selected

Market Package	Element(s)	
	Media	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County EMS	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	State Highway Patrol	-- Not Selected
	Winston-Salem PD	-- Not Selected
Emergency Routing (EM2) -- Existing		
	Alamance County EMS	-- Not Selected
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of Greensboro PD	
	City of Greensboro PD_Personnel	
	City of High Point	-- Not Selected
	City of High Point PD	
	City of High Point PD_Personnel	
	City of High Point_Personnel	
	City of Kernersville	-- Not Selected
	City of Winston-Salem	
	City of Winston-Salem_Personnel	
	Davidson County	-- Not Selected
	Davidson County_Personnel	-- Not Selected
	Emergency Vehicles_Burlington	-- Not Selected
	Emergency Vehicles_Davidson County	-- Not Selected
	Emergency Vehicles_Greensboro	-- Not Selected
	Emergency Vehicles_High Point	
	Emergency Vehicles_Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	Forsyth County EMS	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Guilford County EMS	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County EMS	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	State Highway Patrol	-- Not Selected
	Vehicles	-- Not Selected
	Winston-Salem PD	-- Not Selected
HAZMAT Management (CVO10) -- Existing		
	Alamance County EMS	-- Not Selected
	City of Burlington	-- Not Selected

Market Package	Element(s)	
	City of Greensboro	-- Not Selected
	City of Greensboro PD	
	City of High Point	-- Not Selected
	City of High Point PD	
	City of Kernersville	-- Not Selected
	City of Winston-Salem	
	Davidson County	
	Forsyth County	-- Not Selected
	Forsyth County EMS	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Guilford County EMS	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County EMS	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	State Highway Patrol	-- Not Selected
	Vehicles	-- Not Selected
	Winston-Salem PD	-- Not Selected
Transit Maintenance (APTS6) -- Existing		
	City of Greensboro_Personnel	
	City of Winston-Salem	-- Not Selected
	City of Winston-Salem_Personnel	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Greensboro Transit Vehicles	-- Not Selected
Transit Traveler Information (APTS8) -- Existing		
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of Greensboro_Kiosks	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	
	Forsyth County	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Greensboro Transit Vehicles	-- Not Selected
	Guilford County	-- Not Selected
	Media	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	NCDOT_Kiosks	-- Not Selected
	Randolph County	-- Not Selected
	User Personal Computing Devices	
	Vehicles	-- Not Selected
Advanced Railroad Grade Crossing (ATMS14) -- Not Planned		

Market Package	Element(s)	
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
Advanced Vehicle Lateral Control (AVSS09) -- Not Planned		
	Vehicles	-- Not Selected
Advanced Vehicle Longitudinal Control (AVSS08) -- Not Planned		
	Vehicles	-- Not Selected
Automated Highway System (AVSS11) -- Not Planned		
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Vehicles	-- Not Selected
Autonomous Route Guidance (ATIS3) -- Not Planned		
	Alamance County EMS	-- Not Selected
	City of Greensboro	-- Not Selected
	City of Greensboro PD	-- Not Selected
	City of High Point PD	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Emergency Vehicles_Burlington	-- Not Selected
	Emergency Vehicles_Davidson County	-- Not Selected
	Emergency Vehicles_Greensboro	-- Not Selected
	Emergency Vehicles_High Point	-- Not Selected
	Emergency Vehicles_Winston-Salem	-- Not Selected
	Greensboro Transit Vehicles	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County Sheriff	-- Not Selected

Market Package	Element(s)	
	State Highway Patrol	-- Not Selected
	User Personal Computing Devices	-- Not Selected
	Vehicles	-- Not Selected
	Winston-Salem PD	-- Not Selected
CV Administrative Processes (CVO04) -- Not Planned		
	Alamance County EMS	-- Not Selected
	City of Greensboro PD	-- Not Selected
	City of High Point PD	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	State Highway Patrol	-- Not Selected
	Winston-Salem PD	-- Not Selected
Driver Safety Monitoring (AVSS02) -- Not Planned		
	Vehicles	-- Not Selected
Driver Visibility Improvement (AVSS07) -- Not Planned		
	Vehicles	-- Not Selected
Dynamic Ridesharing (ATIS8) -- Not Planned		
	City of Greensboro	-- Not Selected
	City of Greensboro_Kiosks	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Guilford County	-- Not Selected
	Guilford County_Personnel	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	NCDOT_Kiosks	-- Not Selected
	User Personal Computing Devices	-- Not Selected
	Vehicles	-- Not Selected
Dynamic Route Guidance (ATIS4) -- Not Planned		
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Guilford County	-- Not Selected
	Guilford County_Personnel	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected

Market Package	Element(s)	
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	User Personal Computing Devices	-- Not Selected
	Vehicles	-- Not Selected
Electronic Clearance (CVO03) -- Not Planned		
	State Highway Patrol	-- Not Selected
Electronic Toll Collection (ATMS10) -- Not Planned		
	Alamance County EMS	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of Greensboro PD	-- Not Selected
	City of High Point	-- Not Selected
	City of High Point PD	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Guilford County	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	State Highway Patrol	-- Not Selected
	Vehicles	-- Not Selected
	Winston-Salem PD	-- Not Selected
Emissions Monitoring and Management (ATMS11) -- Not Planned		
	Alamance County_Personnel	-- Not Selected
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	Guilford County	-- Not Selected
	Media	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County_Personnel	-- Not Selected
Fleet Administration (CVO01) -- Not Planned		
	Guilford County	-- Not Selected

Market Packages for Region Triad

Market Package	Element(s)	
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Vehicles	-- Not Selected
Freight Administration (CVO02) -- Not Planned		
	Vehicles	-- Not Selected
HOV Lane Management (ATMS05) -- Not Planned		
	Alamance County EMS	-- Not Selected
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of Greensboro PD	-- Not Selected
	City of High Point	-- Not Selected
	City of High Point PD	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	State Highway Patrol	-- Not Selected
	Winston-Salem PD	-- Not Selected
Integrated Transportation Management/Route Guidance (ATIS6) -- Not Planned		
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	Guilford County	-- Not Selected
	Guilford County_Personnel	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	User Personal Computing Devices	-- Not Selected
	Vehicles	-- Not Selected
Interactive Traveler Information (ATIS2) -- Not Planned		
	Alamance County EMS	-- Not Selected
	City of Burlington	-- Not Selected

Market Package	Element(s)	
	City of Greensboro	-- Not Selected
	City of Greensboro PD	-- Not Selected
	City of Greensboro_Kiosks	-- Not Selected
	City of High Point	-- Not Selected
	City of High Point PD	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Davidson County	-- Not Selected
	Forsyth County	-- Not Selected
	Forsyth County EMS	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Greensboro Transit Vehicles	-- Not Selected
	Guilford County	-- Not Selected
	Guilford County EMS	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	Guilford County_Personnel	-- Not Selected
	Media	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	NCDOT_Kiosks	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County EMS	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	State Highway Patrol	-- Not Selected
	User Personal Computing Devices	-- Not Selected
	Vehicles	-- Not Selected
	Winston-Salem PD	-- Not Selected
Intersection Collision Avoidance (AVSS10) -- Not Planned		
	Alamance County_Roadside Equipment	-- Not Selected
	Vehicles	-- Not Selected
Intersection Safety Warning (AVSS05) -- Not Planned		
	Alamance County_Roadside Equipment	-- Not Selected
	Vehicles	-- Not Selected
ITS Data Mart (AD1) -- Not Planned		
	Alamance County EMS	-- Not Selected
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of Greensboro PD	-- Not Selected
	City of High Point	-- Not Selected
	City of High Point PD	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected

Market Package	Element(s)	
	Davidson County	-- Not Selected
	Forsyth County	-- Not Selected
	Forsyth County EMS	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Guilford County	-- Not Selected
	Guilford County EMS	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County EMS	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	State Highway Patrol	-- Not Selected
	Winston-Salem PD	-- Not Selected
ITS Data Warehouse (AD2) -- Not Planned		
	Alamance County EMS	-- Not Selected
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of Greensboro PD	-- Not Selected
	City of High Point	-- Not Selected
	City of High Point PD	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Davidson County	-- Not Selected
	Forsyth County	-- Not Selected
	Forsyth County EMS	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Guilford County	-- Not Selected
	Guilford County EMS	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County EMS	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	State Highway Patrol	-- Not Selected
	Winston-Salem PD	-- Not Selected
ITS Virtual Data Warehouse (AD3) -- Not Planned		
	NCDOT - Statewide	-- Not Selected
Lateral Safety Warning (AVSS04) -- Not Planned		
	Vehicles	-- Not Selected

Market Packages for Region Triad

Market Package	Element(s)	
Longitudinal Safety Warning (AVSS03) -- Not Planned		
	Vehicles	-- Not Selected
Mayday Support (EM3) -- Not Planned		
	Alamance County EMS	-- Not Selected
	City of Greensboro	-- Not Selected
	City of Greensboro PD	-- Not Selected
	City of Greensboro PD_Personnel	-- Not Selected
	City of Greensboro_Kiosks	-- Not Selected
	City of High Point PD	-- Not Selected
	City of High Point PD_Personnel	-- Not Selected
	City of High Point_Personnel	-- Not Selected
	City of Winston-Salem	-- Not Selected
	City of Winston-Salem_Personnel	-- Not Selected
	Davidson County	-- Not Selected
	Davidson County_Personnel	-- Not Selected
	Forsyth County EMS	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Guilford County EMS	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	NCDOT_Kiosks	-- Not Selected
	Randolph County EMS	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	State Highway Patrol	-- Not Selected
	User Personal Computing Devices	-- Not Selected
	Vehicles	-- Not Selected
	Winston-Salem PD	-- Not Selected
Multi-modal Coordination (APTS7) -- Not Planned		
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Greensboro Transit Vehicles	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
On-board CVO Safety (CVO08) -- Not Planned		
	State Highway Patrol	-- Not Selected

Market Package	Element(s)	
Parking Facility Management (ATMS16) -- Not Planned		
	Alamance County EMS	-- Not Selected
	City of Greensboro PD	-- Not Selected
	City of High Point PD	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Guilford County	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	State Highway Patrol	-- Not Selected
	Vehicles	-- Not Selected
	Winston-Salem PD	-- Not Selected
Pre-Crash Restraint Deployment (AVSS06) -- Not Planned		
	Vehicles	-- Not Selected
Railroad Operations Coordination (ATMS15) -- Not Planned		
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	Guilford County	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
Regional Parking Management (ATMS19) -- Not Planned		
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
Reversible Lane Management (ATMS17) -- Not Planned		
	Alamance County_Personnel	-- Not Selected

Market Packages for Region Triad

Market Package	Element(s)	
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County_Personnel	-- Not Selected
Road Weather Information System (ATMS18) -- Not Planned		
	Alamance County_Personnel	-- Not Selected
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County_Personnel	-- Not Selected
Roadside CVO Safety (CVO07) -- Not Planned		
	State Highway Patrol	-- Not Selected
Standard Railroad Grade Crossing (ATMS13) -- Not Planned		
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
Traffic Forecast and Demand Management (ATMS09) -- Not Planned		
	Alamance County_Personnel	-- Not Selected
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected

Market Packages for Region Triad

Market Package	Element(s)	
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Guilford County	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County_Personnel	-- Not Selected
Transit Security (APTS5) -- Not Planned		
	Alamance County EMS	-- Not Selected
	City of Greensboro	-- Not Selected
	City of Greensboro PD	-- Not Selected
	City of Greensboro_Kiosks	-- Not Selected
	City of Greensboro_Personnel	-- Not Selected
	City of High Point PD	-- Not Selected
	City of Winston-Salem	-- Not Selected
	City of Winston-Salem_Personnel	-- Not Selected
	Davidson County	-- Not Selected
	Forsyth County EMS	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Greensboro Transit Vehicles	-- Not Selected
	Guilford County	-- Not Selected
	Guilford County EMS	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	Media	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	NCDOT_Kiosks	-- Not Selected
	Randolph County EMS	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	State Highway Patrol	-- Not Selected
	Winston-Salem PD	-- Not Selected
Vehicle Safety Monitoring (AVSS01) -- Not Planned		
	Vehicles	-- Not Selected
Virtual TMC and Smart Probe Data (ATMS12) -- Not Planned		
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected

Market Packages for Region Triad

Market Package	Element(s)	
	Forsyth County	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Vehicles	-- Not Selected
Yellow Pages and Reservation (ATIS7) -- Not Planned		
	City of Greensboro	-- Not Selected
	City of Greensboro_Kiosks	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Guilford County	-- Not Selected
	Guilford County_Personnel	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	NCDOT_Kiosks	-- Not Selected
	User Personal Computing Devices	-- Not Selected
	Vehicles	-- Not Selected
Broadcast Traveler Information (ATIS1) -- Planned		
	Alamance County EMS	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of Greensboro PD	-- Not Selected
	City of Greensboro_Kiosks	-- Not Selected
	City of High Point	-- Not Selected
	City of High Point PD	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Davidson County	-- Not Selected
	Forsyth County	-- Not Selected
	Forsyth County EMS	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Guilford County	-- Not Selected
	Guilford County EMS	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	Guilford County_Personnel	-- Not Selected
	Media	
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	NCDOT_Kiosks	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County EMS	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	State Highway Patrol	-- Not Selected
	User Personal Computing Devices	

Market Package	Element(s)	
	Vehicles	
	Winston-Salem PD	-- Not Selected
Freeway Control (ATMS04) -- Planned		
	Alamance County_Personnel	
	Alamance County_Roadside Equipment	
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	
	Randolph County_Personnel	
In Vehicle Signing (ATIS9) -- Planned		
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Vehicles	-- Not Selected
Incident Management System (ATMS08) -- Planned		
	Alamance County EMS	
	Alamance County_Personnel	
	Alamance County_Roadside Equipment	
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of Greensboro PD	
	City of Greensboro PD_Personnel	
	City of High Point	-- Not Selected
	City of High Point PD	
	City of High Point PD_Personnel	
	City of High Point_Personnel	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	City of Winston-Salem_Personnel	-- Not Selected
	Davidson County	-- Not Selected
	Davidson County_Personnel	-- Not Selected
	Emergency Vehicles_Burlington	-- Not Selected

Market Packages for Region Triad

Market Package	Element(s)	
	Emergency Vehicles_Davidson County	-- Not Selected
	Emergency Vehicles_Greensboro	-- Not Selected
	Emergency Vehicles_High Point	
	Emergency Vehicles_Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	Forsyth County EMS	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Guilford County	-- Not Selected
	Guilford County EMS	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	Media	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County EMS	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	Randolph County_Personnel	-- Not Selected
	State Highway Patrol	-- Not Selected
	Winston-Salem PD	-- Not Selected
ISP Based Route Guidance (ATIS5) -- Planned		
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of Greensboro_Kiosks	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Guilford County	-- Not Selected
	Guilford County_Personnel	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	NCDOT_Kiosks	-- Not Selected
	Randolph County	-- Not Selected
	User Personal Computing Devices	
	Vehicles	-- Not Selected
Network Surveillance (ATMS01) -- Planned		
	Alamance County_Personnel	
	Alamance County_Roadside Equipment	
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected

Market Package	Element(s)	
	Forsyth County	-- Not Selected
	Guilford County	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County_Personnel	-- Not Selected
Probe Surveillance (ATMS02) – Planned		
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	Guilford County	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Vehicles	-- Not Selected
Regional Traffic Control (ATMS07) -- Planned		
	Alamance County_Personnel	-- Not Selected
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Forsyth County	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County_Personnel	-- Not Selected
Surface Street Control (ATMS03) – Planned		
	Alamance County EMS	-- Not Selected
	Alamance County_Personnel	-- Not Selected
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of Greensboro PD	-- Not Selected
	City of High Point	-- Not Selected
	City of High Point PD	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected

Market Packages for Region Triad

Market Package	Element(s)	
	Davidson County	-- Not Selected
	Forsyth County	-- Not Selected
	Forsyth County EMS	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Guilford County EMS	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County EMS	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	Randolph County_Personnel	-- Not Selected
	State Highway Patrol	-- Not Selected
	Winston-Salem PD	-- Not Selected
Traffic Information Dissemination (ATMS06) -- Planned		
	Alamance County EMS	-- Not Selected
	Alamance County_Personnel	-- Not Selected
	Alamance County_Roadside Equipment	-- Not Selected
	City of Burlington	-- Not Selected
	City of Greensboro	-- Not Selected
	City of Greensboro PD	-- Not Selected
	City of High Point	-- Not Selected
	City of High Point PD	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	-- Not Selected
	Davidson County	-- Not Selected
	Forsyth County	-- Not Selected
	Forsyth County EMS	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Guilford County	-- Not Selected
	Guilford County EMS	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	Media	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
	Randolph County EMS	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	Randolph County_Personnel	-- Not Selected
	State Highway Patrol	-- Not Selected
	Winston-Salem PD	-- Not Selected
Transit Fixed-Route Operations (APTS2) -- Planned		
	City of Burlington	-- Not Selected
	City of Greensboro	

Market Package	Element(s)	
	City of Greensboro_Personnel	
	City of High Point	-- Not Selected
	City of Kernersville	-- Not Selected
	City of Winston-Salem	
	City of Winston-Salem_Personnel	
	Forsyth County	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Greensboro Transit Vehicles	
	Guilford County	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Randolph County	-- Not Selected
Transit Passenger and Fare Management (APTS4) -- Planned		
	Alamance County EMS	-- Not Selected
	City of Greensboro PD	-- Not Selected
	City of Greensboro_Kiosks	
	City of Greensboro_Personnel	-- Not Selected
	City of High Point PD	-- Not Selected
	City of Winston-Salem	-- Not Selected
	City of Winston-Salem_Personnel	-- Not Selected
	Forsyth County Sheriff	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Greensboro Transit Vehicles	
	Guilford County	-- Not Selected
	Guilford County Sheriff	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	NCDOT_Kiosks	-- Not Selected
	Randolph County Sheriff	-- Not Selected
	State Highway Patrol	-- Not Selected
	Winston-Salem PD	-- Not Selected
Transit Vehicle Tracking (APTS1) -- Planned		
	City of Winston-Salem	-- Not Selected
	Greensboro Transit Agency	-- Not Selected
	Greensboro Transit Vehicles	
	Guilford County	-- Not Selected
	NCDOT - Statewide	-- Not Selected
	NCDOT Division 7	-- Not Selected
	NCDOT Division 9	-- Not Selected
	Vehicles	-- Not Selected

Relevant Standards Activities

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Standards for Region Triad

Organization	Standard Name	Document ID
SAE	Advanced Traveler Information System (ATIS) Data Dictionary	J2353
SAE	Advanced Traveler Information System (ATIS) Message Set	J2354
EIA/CEA	Data Radio Channel (DARC) System	EIA-794
SAE	ISP-Vehicle Location Referencing Message Profiles	J1746
ITE	Message Set for External TMC Communication (MS/ETMCC)	TM 2.01
AASHTO	NTCIP - Application Profile for File Transfer Protocol (FTP)	2303
AASHTO	NTCIP - Application Profile for Simple Transportation Management Framework (STMF)	2301
AASHTO	NTCIP - Application Profile for Trivial File Transfer Protocol	2302
AASHTO	NTCIP - Applications Profile for Common Object Request Broker Architecture (CORBA)	2305
AASHTO	NTCIP - Applications Profile for Data Exchange ASN.1 (DATEX)	2304
AASHTO	NTCIP - Base Standard: Octet Encoding Rules (OER)	1102
AASHTO	NTCIP - Class B Profile	2001

Standards for Region Triad

Organization	Standard Name	Document ID
AASHTO	NTCIP - Data Collection & Monitoring Devices	1206
AASHTO	NTCIP - Data Dictionary for Closed Circuit Television (CCTV)	1205
AASHTO	NTCIP - Global Object Definitions	1201
AASHTO	NTCIP - Internet (TCP/IP and UDP/IP) Transport Profile	2202
AASHTO	NTCIP - Object Definitions for Actuated Traffic Signal Controller Units	1202
AASHTO	NTCIP - Object Definitions for Dynamic Message Signs	1203
AASHTO	NTCIP - Object Definitions for Environmental Sensor Stations & Roadside Weather Information System	1204
AASHTO	NTCIP - Object Definitions for Video Switches	1208
AASHTO	NTCIP - Point to Multi-Point Protocol Using RS-232 Subnetwork Profile	2101
AASHTO	NTCIP - Ramp Meter Controller Objects	1207
AASHTO	NTCIP - Simple Transportation Management Framework (STMF)	1101
AASHTO	NTCIP - Simple Transportation Management Protocol (STMP)	1103
AASHTO	NTCIP - Subnetwork Profile for Ethernet	2104

Standards for Region Triad

Organization	Standard Name	Document ID
AASHTO	NTCIP - Subnetwork Profile for Point-to-Point Protocol using RS 232	2103
AASHTO	NTCIP - Transportation System Sensor Objects	1209
SAE	On-Board Land Vehicle Mayday Reporting Interface	J2313
SAE	Standard for ATIS Message Sets Delivered Over Bandwidth Restricted Media	J2369
IEEE	Standard for Common Incident Management Message Sets (IMMS) for use by EMCs	P1512
ITE	Standard for Functional Level Traffic Management Data Dictionary (TMDD)	TM 1.03
ASTM	Standard Specification for DSRC - Data Link Layer	Draft Z7633Z
ASTM	Standard Specification for DSRC - Physical Layer 902-928 MHz	PS 111-98
EIA/CEA	Subcarrier Traffic Information Channel (STIC) System	EIA-795
ITE	TCIP - Common Public Transportation (CPT) Business Area Standard	1401
ITE	TCIP - Control Center (CC) Business Area Standard	1407
ITE	TCIP - Fare Collection (FC) Business Area Standard	1408
ITE	TCIP - Incident Management (IM) Business Area Standard	1402

Standards for Region Triad

Organization	Standard Name	Document ID
ITE	TCIP - Onboard (OB) Business Area Standard	1406
ITE	TCIP - Passenger Information (PI) Business Area Standard	1403
ITE	TCIP - Scheduling/Runcutting (SCH) Business Area Standard	1404
ITE	TCIP - Spatial Representation (SP) Business Area Standard	1405
ITE	TCIP - Traffic Management (TM) Business Area Standard	TS 3.TM

Stakeholders Report

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Stakeholder	Description
City of Kernersville	
	Associated Element: City of Kernersville
City of Greensboro	
	Associated Element: City of Greensboro_Kiosks
	Associated Element: City of Greensboro_Personnel
	Associated Element: Emergency Vehicles_High Point
	Associated Element: Greensboro Transit Agency
	Associated Element: City of Greensboro PD
	Associated Element: City of Greensboro PD_Personnel
	Associated Element: Greensboro Transit Vehicles
	Associated Element: City of Greensboro
	Associated Element: Emergency Vehicles_Greensboro
City of High Point	
	Associated Element: City of High Point_Personnel
	Associated Element: City of High Point PD
	Associated Element: City of High Point PD_Personnel
	Associated Element: City of High Point
City of Winston-Salem	
	Associated Element: Winston-Salem PD
	Associated Element: City of Winston-Salem
	Associated Element: Emergency Vehicles_Winston-Salem
	Associated Element: City of Winston-Salem_Personnel
Alamance County	
	Associated Element: Alamance County EMS
	Associated Element: Alamance County_Personnel
	Associated Element: Alamance County_Roadside Equipment
Randolph County	
	Associated Element: Randolph County
	Associated Element: Randolph County EMS
	Associated Element: Randolph County Sheriff
	Associated Element: Randolph County_Personnel
Davidson County	

Stakeholder	Description
	Associated Element: Davidson County_Personnel
	Associated Element: Emergency Vehicles_Davidson County
	Associated Element: Davidson County
Guilford County	
	Associated Element: Guilford County EMS
	Associated Element: Guilford County Sheriff
Forsyth County	
	Associated Element: Forsyth County EMS
	Associated Element: Forsyth County
	Associated Element: Forsyth County Sheriff
Triad Region	
NCDOT	
	Associated Element: NCDOT - Statewide
	Associated Element: NCDOT Division 7
	Associated Element: NCDOT Division 9
	Associated Element: Vehicles
	Associated Element: NCDOT_Kiosks
Eastern Triad TMC	
	Associated Element: Guilford County
	Associated Element: Guilford County_Personnel
City of Burlington	
	Associated Element: Emergency Vehicles_Burlington
	Associated Element: City of Burlington
Western Triad	
Eastern Triad Region	
State Highway Patrol	
	Associated Element: State Highway Patrol

Regional Architecture: Triad

FlowName: traffic operator data **Flow Status:** Planned

Source: Alamance County EMS

Destination: Alamance County_Personnel

In Regional Architecture?: True

FlowName: freeway control data **Flow Status:** Planned

Source: Alamance County EMS

Destination: Alamance County_Roadside Equipment

In Regional Architecture?: True

FlowName: roadway information system data **Flow Status:** Planned

Source: Alamance County EMS

Destination: Alamance County_Roadside Equipment

In Regional Architecture?: True

FlowName: sensor and surveillance control **Flow Status:** Planned

Source: Alamance County EMS

Destination: Alamance County_Roadside Equipment

In Regional Architecture?: True

FlowName: incident information **Flow Status:** Planned

Source: Alamance County EMS

Destination: City of Burlington

In Regional Architecture?: True

FlowName: incident response status **Flow Status:** Planned

Source: Alamance County EMS

Destination: City of Burlington

In Regional Architecture?: True

FlowName: remote surveillance control **Flow Status:** Existing

Source: Alamance County EMS

Destination: City of Burlington

In Regional Architecture?: True

FlowName: resource request **Flow Status:** Existing

Source: Alamance County EMS

Destination: City of Burlington

In Regional Architecture?: True

FlowName: emergency dispatch requests **Flow Status:** Existing

Source: Alamance County EMS

Destination: Emergency Vehicles_Burlington

In Regional Architecture?: True

FlowName: emergency personnel inputs **Flow Status:** Existing

Source: Alamance County EMS

Destination: Emergency Vehicles_Burlington

In Regional Architecture?: True

FlowName: incident command information **Flow Status:** Existing

Source: Alamance County EMS

Destination: Emergency Vehicles_Burlington

In Regional Architecture?: True

FlowName: suggested route **Flow Status:** Existing

Source: Alamance County EMS

Destination: Emergency Vehicles_Burlington

In Regional Architecture?: True

FlowName: incident information **Flow Status:** Planned

Source: Alamance County EMS

Destination: NCDOT - Statewide

In Regional Architecture?: True

FlowName: emergency dispatch response **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: emergency operations request **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: emergency traffic control request **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: emergency vehicle tracking data **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: incident command request **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: incident information **Flow Status:** Planned

Source: Alamance County EMS

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: incident information for media **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: incident notification **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: incident report **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: incident response coordination **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: incident response status

Flow Status: Planned

Source: Alamance County EMS

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: incident status

Flow Status: Existing

Source: Alamance County EMS

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: remote surveillance control

Flow Status: Existing

Source: Alamance County EMS

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: resource request

Flow Status: Existing

Source: Alamance County EMS

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: emergency dispatch response

Flow Status: Existing

Source: Alamance County EMS

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: emergency operations request

Flow Status: Existing

Source: Alamance County EMS

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: emergency traffic control request **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: emergency vehicle tracking data **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: incident command request **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: incident information **Flow Status:** Planned

Source: Alamance County EMS

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: incident information for media **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: incident notification **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: incident report **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: incident response coordination **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: incident response status **Flow Status:** Planned

Source: Alamance County EMS

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: incident status **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: remote surveillance control **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: resource request **Flow Status:** Existing

Source: Alamance County EMS

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: dispatch information **Flow Status:** Existing

Source: Alamance County EMS

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: emergency dispatch requests **Flow Status:** Existing

Source: Alamance County EMS

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: emergency dispatch response **Flow Status:** Existing

Source: Alamance County EMS

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: emergency operations request **Flow Status:** Existing

Source: Alamance County EMS

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: emergency personnel inputs **Flow Status:** Existing

Source: Alamance County EMS

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: emergency vehicle tracking data **Flow Status:** Existing

Source: Alamance County EMS

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: incident command information **Flow Status:** Existing

Source: Alamance County EMS

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: incident command information presentation **Flow Status:** Existing

Source: Alamance County EMS

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: incident command request **Flow Status:** Existing

Source: Alamance County EMS

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: incident notification **Flow Status:** Existing

Source: Alamance County EMS

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: incident notification response **Flow Status:** Existing

Source: Alamance County EMS

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: incident report **Flow Status:** Existing

Source: Alamance County EMS

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: incident response coordination **Flow Status:** Existing

Source: Alamance County EMS

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: incident status **Flow Status:** Existing

Source: Alamance County EMS

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: suggested route **Flow Status:** Existing

Source: Alamance County EMS

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: traffic operator inputs **Flow Status:** Planned

Source: Alamance County_Personnel

Destination: Alamance County EMS

In Regional Architecture?: True

FlowName: traffic operator inputs **Flow Status:** Planned

Source: Alamance County_Personnel

Destination: City of Burlington

In Regional Architecture?: True

FlowName: traffic operator inputs **Flow Status:** Planned

Source: Alamance County_Personnel

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: traffic operator inputs **Flow Status:** Planned

Source: Alamance County_Personnel

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: fault reports **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: Alamance County EMS

In Regional Architecture?: True

FlowName: freeway control status **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: Alamance County EMS

In Regional Architecture?: True

FlowName: incident data **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: Alamance County EMS

In Regional Architecture?: True

FlowName: traffic flow **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: Alamance County EMS

In Regional Architecture?: True

FlowName: traffic images **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: Alamance County EMS

In Regional Architecture?: True

FlowName: roadside archive data **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT - Statewide

In Regional Architecture?: True

FlowName: emissions data **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: environmental conditions **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: fault reports **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: freeway control status **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: hov data **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: hri status **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: incident data **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: intersection blockage notification **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: request for right-of-way **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: reversible lane status **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: roadway information system status **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: signal control status **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: traffic flow **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: traffic images **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: vehicle probe data **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: emissions data **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: environmental conditions **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: fault reports **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: freeway control status **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: hov data **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: hri status **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: incident data **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: intersection blockage notification **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: request for right-of-way **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: reversible lane status **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: roadway information system status **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: signal control status **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: traffic flow **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: traffic images **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: vehicle probe data **Flow Status:** Planned

Source: Alamance County_Roadside Equipment

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: incident information **Flow Status:** Existing

Source: City of Burlington

Destination: Alamance County EMS

In Regional Architecture?: True

FlowName: incident information request **Flow Status:** Planned

Source: City of Burlington

Destination: Alamance County EMS

In Regional Architecture?: True

FlowName: resource deployment status **Flow Status:** Existing

Source: City of Burlington

Destination: Alamance County EMS

In Regional Architecture?: True

FlowName: traffic operator data **Flow Status:** Planned

Source: City of Burlington

Destination: Alamance County_Personnel

In Regional Architecture?: True

FlowName: current network conditions **Flow Status:** Existing

Source: City of Burlington

Destination: City of Greensboro

In Regional Architecture?: True

FlowName: resource deployment status **Flow Status:** Existing

Source: City of Burlington

Destination: City of Greensboro

In Regional Architecture?: True

FlowName: current network conditions **Flow Status:** Existing

Source: City of Burlington

Destination: City of Winston-Salem

In Regional Architecture?: True

FlowName: emergency traffic control response **Flow Status:** Existing

Source: City of Burlington

Destination: City of Winston-Salem

In Regional Architecture?: True

FlowName: incident information **Flow Status:** Existing

Source: City of Burlington

Destination: City of Winston-Salem

In Regional Architecture?: True

FlowName: request transit information **Flow Status:** Existing

Source: City of Burlington

Destination: City of Winston-Salem

In Regional Architecture?: True

FlowName: resource deployment status **Flow Status:** Existing

Source: City of Burlington

Destination: City of Winston-Salem

In Regional Architecture?: True

FlowName: traffic information for transit **Flow Status:** Existing

Source: City of Burlington

Destination: City of Winston-Salem

In Regional Architecture?: True

FlowName: transit demand management request **Flow Status:** Planned

Source: City of Burlington

Destination: City of Winston-Salem

In Regional Architecture?: True

FlowName: request fare and price information **Flow Status:** Planned

Source: City of Burlington

Destination: NCDOT - Statewide

In Regional Architecture?: True

FlowName: traffic archive data **Flow Status:** Planned

Source: City of Burlington

Destination: NCDOT - Statewide

In Regional Architecture?: True

FlowName: traffic information **Flow Status:** Planned

Source: City of Burlington

Destination: NCDOT - Statewide

In Regional Architecture?: True

FlowName: current network conditions **Flow Status:** Existing

Source: City of Burlington

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: emergency traffic control response **Flow Status:** Existing

Source: City of Burlington

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: incident information **Flow Status:** Existing

Source: City of Burlington

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: incident information request **Flow Status:** Planned

Source: City of Burlington

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: request fare and price information **Flow Status:** Planned

Source: City of Burlington

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: resource deployment status **Flow Status:** Existing

Source: City of Burlington

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: traffic control coordination **Flow Status:** Planned

Source: City of Burlington

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: traffic information **Flow Status:** Planned

Source: City of Burlington

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: traffic information coordination **Flow Status:** Planned

Source: City of Burlington

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: traffic information for media **Flow Status:** Planned

Source: City of Burlington

Destination: NCDOT Division 7

In Regional Architecture?: True

FlowName: current network conditions **Flow Status:** Existing

Source: City of Burlington

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: emergency traffic control response **Flow Status:** Existing

Source: City of Burlington

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: incident information **Flow Status:** Existing

Source: City of Burlington

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: incident information request **Flow Status:** Planned

Source: City of Burlington

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: request fare and price information **Flow Status:** Planned

Source: City of Burlington

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: resource deployment status **Flow Status:** Existing

Source: City of Burlington

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: traffic control coordination **Flow Status:** Planned

Source: City of Burlington

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: traffic information **Flow Status:** Planned

Source: City of Burlington

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: traffic information coordination **Flow Status:** Planned

Source: City of Burlington

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: traffic information for media **Flow Status:** Planned

Source: City of Burlington

Destination: NCDOT Division 9

In Regional Architecture?: True

FlowName: current network conditions **Flow Status:** Existing

Source: City of Burlington

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: emergency traffic control response **Flow Status:** Existing

Source: City of Burlington

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: incident information **Flow Status:** Existing

Source: City of Burlington

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: incident information request **Flow Status:** Planned

Source: City of Burlington

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: resource deployment status **Flow Status:** Existing

Source: City of Burlington

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: violation notification **Flow Status:** Planned

Source: City of Burlington

Destination: State Highway Patrol

In Regional Architecture?: True

FlowName: remote surveillance control **Flow Status:** Existing

Source: City of Greensboro

Destination: City of Burlington

In Regional Architecture?: True

FlowName: resource request **Flow Status:** Existing

Source: City of Greensboro

Destination: City of Burlington

In Regional Architecture?: True

FlowName: current network conditions **Flow Status:** Existing

Source: City of Greensboro

Destination: City of Greensboro PD

In Regional Architecture?: True

FlowName: emergency dispatch requests **Flow Status:** Existing

Source: City of Greensboro

Destination: City of Greensboro PD

In Regional Architecture?: True

FlowName: emergency operations status **Flow Status:** Existing

Source: City of Greensboro

Destination: City of Greensboro PD

In Regional Architecture?: True

FlowName: emergency traffic control response **Flow Status:** Existing

Source: City of Greensboro

Destination: City of Greensboro PD

In Regional Architecture?: True

FlowName: incident command information **Flow Status:** Existing

Source: City of Greensboro

Destination: City of Greensboro PD

In Regional Architecture?: True

FlowName: incident information **Flow Status:** Existing

Source: City of Greensboro

Destination: City of Greensboro PD

In Regional Architecture?: True

FlowName: incident information request **Flow Status:** Planned

Source: City of Greensboro

Destination: City of Greensboro PD

In Regional Architecture?: True

FlowName: incident notification response **Flow Status:** Existing

Source: City of Greensboro

Destination: City of Greensboro PD

In Regional Architecture?: True

FlowName: incident report **Flow Status:** Existing

Source: City of Greensboro

Destination: City of Greensboro PD

In Regional Architecture?: True